

REVENUE  
DEPARTMENT  
BENGAL.

# MANUAL OF <sup>THE</sup> INDIAN TIMBERS:

THE STRUCTURE, GROWTH, DISTRIBUTION, AND  
QUALITIES OF INDIAN WOODS.

PREPARED BY

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## INTRODUCTION.

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IN publishing the 'Manual of Indian Timbers,' the compilation of which has, owing to the writer having been at the same time engaged in his ordinary official duties, lasted over three years, it is necessary to make a few remarks on the circumstances which have led to its preparation, the materials by the assistance of which it has been compiled, and the sources from which the information given in its pages has been drawn. It will be remembered that the forests and forest products of India were represented at the Paris Exhibition of 1878 by a collection which was undoubtedly the most complete that has ever been formed in India and sent to Europe for exhibition. This collection, prepared and arranged under the immediate supervision of Dr Brandis, the Inspector General of Forests, was got together in the winter of 1877-78, by the simple process of inviting from the different Local Governments and their Forest Officers the contribution of rough wood specimens and other products, which were afterwards prepared and arranged in a central workshop, first in Simla and afterwards in Calcutta. During the progress of this work, which lasted from August 1877 to May 1878, a very large and valuable series of wood specimens, of undoubted botanical determination, was received. The pieces of wood (to which class of specimen alone we need now refer) which were then sent, were so large and valuable that it was settled that at the same time as the principal object of the work, the collection for exhibition at Paris, was got ready, a number of duplicate sets should be also prepared, sufficient to supply a good stock to the Royal Gardens at Kew, and to other museums both in Europe and America, as well as type collections to be deposited in the offices of the Forest Conservators in the different Provinces or Circles. It is obvious that such authentic collections are likely to serve as reference collections of great and undoubted value not only to Forest Officers, but to all persons interested in timber and ornamental woods and their applications to engineering works or industrial manufactures. Chief among these collections was that specially set apart for the Museum of the Forest School of Dehra Dun, and next to it in completeness in India was the collection deposited in

the office of the Conservator of Forests in Bengal at Darjeeling, and it is these two collections, and especially the former, which have been chiefly used and consulted in the preparation of this work. But it is necessary here to point out, that the collections prepared in 1877-78 from the contributions to the Paris Exhibition works, would not alone have sufficed for the description of anything like the number of species which find a place herein, and it was owing to the fortunate circumstance that the large private collection of Dr. Brandis was available that it was found possible to make sure of the identification of most of the more ordinary timbers and lay the foundation for the descriptions which are now published. When it is considered that Dr. Brandis' private collection gave no less than 320 specimens, and that the private collection personally formed by the writer in the Darjeeling forests, and that of Burmese and Andaman woods made by the late Mr. S. Kurz and presented by the Superintendent of the Royal Botanical Gardens, Calcutta, gave a further series of 194 specimens, it will be understood that considerable material was available to add to the nucleus formed by the Paris Exhibition sets. But this is not all, for, by the kindness of several Forest Officers, supplementary pieces were received, sometimes spontaneously, sometimes by special request, from time to time; and there have been, even since the work itself was completely printed, several important additions. These were chiefly obtained by the writer's personal collection in various parts of Bengal, such as Darjeeling, the Western Dúars, Chittagong, Chota Nagpore, and Orissa, and have been described, if not in the pages of the work, at any rate in the rather voluminous Addenda-Corrigenda sheets. In order to explain more definitely the sources from which the original Paris Exhibition woods were obtained, the following extract from Dr. Brandis' Introduction to the Catalogue of specimens of forest produce sent to that Exhibition will be worth quoting:—

“The orders for the preparation of the present collection were received in August 1877; and, as it was necessary to despatch it early in February 1878, so as to be in time for the Exhibition, barely six months were available to bring together specimens from all parts of India, and to prepare and name them. The work was entrusted to the undersigned and to Mr. J. S. Gamble, Assistant Conservator of Forests, who undertook the task of supervising the preparation of the specimens. A workshop was at once established in Simla, and a large number of pieces were collected from the hills in the vicinity of that place. These specimens are numbered from 1 to 115, and from 145 to 159. Early in November the work was transferred to Calcutta, where the specimens from all provinces were collected.

“The bulk of the logs and pieces from which the specimens were prepared arrived in December and January; some, however, were not received until February, after the collection had been prepared, packed, and despatched. It thus happens that a large

proportion of the contributions from the southern forests in the Bombay Presidency from Sind, Oudh, and Chittagong, and a portion of those from Madras and Assam could not be utilized for the Exhibition, because they arrived too late

"The difficulty was, in the short time available, to bring together seasoned pieces of the different species required. Fortunately, a number of pieces collected between 1866 and 1870, from the North West and Central Provinces, the Punjab and British Burma, which had been kept at Calcutta until they should be required, were available. Some of these pieces had decayed or been eaten by insects, but the remainder yielded a number of excellent and thoroughly seasoned specimens, and it is remarkable how well many of the woods had kept in the damp climate of Calcutta. The specimens yielded by these collections were numbered from 160 to 353

"From the Punjab a large, varied, carefully named and selected collection was sent by Mr Baden Powell, the Conservator, and the officers under his orders, the main series is numbered from 881 to 947, while those sent from the forests of Kulu, Kangra and Chamba, by Lieutenant Colonel Stenhouse and Mr Pengelly, are numbered, respectively, 116 to 132, 602 to 617, and 770 to 782<sup>1</sup>

"Besides these collections and those made by the undersigned in Simla, and already alluded to the Rev Mr Heyde of the Moravian Mission, Lahoul sent a number of most interesting specimens from the arid districts of the inner Himalaya (numbered 133 to 144 inclusive) and Mr F Halsey of Madhopur sent a small collection of fine, well seasoned pieces from the district of Gurdaspur (numbered 1190 to 1201)

"The contributions of Ajmere were not large enough to give timber specimens of the size required for the Exhibition, they were numbered from 437 to 472

"Mr Greig, the Conservator of Forests in the North Western Provinces, sent collections made by Messrs O Callaghan and Bagshawe and Captain Campbell in the forests of Dehra Dun, Jaunsar and Kumoun, they are numbered respectively 527 to 544, 420 to 432 and 873 to 875. Larger collections had been made, but, as the logs were unseasoned, they were not sent down to Calcutta. From Oudh a few well-seasoned pieces were early received (Nos 387 to 394), but the remainder did not arrive till after the Exhibition specimens had left Calcutta

"The collections sent from Bengal under the orders of the Conservator, Dr W. Schlich, arrived with the exception of those from Chittagong, in very good time, and furnished a large number of interesting specimens from parts of the country the forest resources of which are not yet generally known. Mr Richardson's contributions from the Sundarbans (Nos 395 to 419) illustrate well the forest growth of the delta of the Ganges and Brahmaputra, and those sent by Mr Chester from Chittagong (Nos 708 to 722, and 1951 to 1965) would have been of great interest had not the main series arrived too late. But the chief collections received were sent by Messrs Johnston and Manson and the late Mr Bonham Carter from the Darjeeling Hills and Terai, numbering 170 pieces (Nos 351 to 385, 433 to 436, 473 to 500, 573 to 601, 618 to 627, and 641 to 707), and including several very valuable and interesting kinds of timber. Besides these a small collection of 14 specimens (Nos 964 to 976) was obtained by Dr Schlich from the valley of Chumbi, to the north of Sikkim, which, though to the south of the main Himalayan range, is actually in Thibet territory, and which had not hitherto been explored

"The collections from Assam sent by Mr Gustav Mann the Deputy Conservator, and by the Deputy Commissioners of Cachar and Sylhet included many fine and well-seasoned pieces. These were numbered from 628 to 641, 783 to 799, 1228 to 1231, 1254 to 1277, 1285 to 1300—the last numbers arriving too late for the Exhibition

<sup>1</sup> Besides the numbers here given as indicating the specimens received from the Punjab and other provinces, there are a few scattered numbers which it has not been thought necessary to quote

"From the Central Provinces, the Conservator, Captain Doveton, sent a collection of well-seasoned pieces, numbering 1101 to 1186, procured by Mr. Richard Thompson from the Chanda forests.

"From Berar Mr. Drysdale, the Deputy Conservator, sent fine pieces of timber, numbered 820 to 814, and a valuable series of fibres, numbered 977 to 989.

"The contributions from the Bombay Presidency comprised a few pieces from Guzerat, Poona, and Ahmednagar, too small for cutting up, and a number of large pieces sent by Lieutenant-Colonel Peyton, the Conservator, and Mr. Barrett, the Deputy Conservator, from North Kanara, numbered 992, 993, 1217 to 1227: the latter, as well as the Sind specimens already referred to, and numbered 1379 to 1381, unfortunately arriving too late for the Exhibition.

"The collections sent from Madras were very full and complete. Those from the eastern side of the Presidency were sent by Colonel Beddome, the Conservator, and numbered from 1051 to 1102. Besides this collection a few logs and specimens of minor produce came from Gumsûr—the logs too late for cutting up. From the West Coast were received a large number of specimens, Nos. 723 to 769, 815 to 869, prepared by Mr. Cherry in South Kanara. From Malabar Mr. Ferguson, the officer in charge, sent a most interesting series of sections of young trees, illustrating the rapid growth of teak in the magnificent Conolly plantations at Nilambûr.

"The pieces received from Burma were not very numerous, though they comprised the most useful kinds of trees. Many of them were of very large size. The logs sent by Major Seaton, the Conservator at Moulmein, were numbered 515 to 551 and 1944 to 1950; while those from Mr. Ribbentrop, the Conservator at Rangoon, were from 555 to 572 and from 801 to 819.

"A most important collection was sent from the Andaman Islands by Major General Barwell, the Chief Commissioner. It consisted of 26 large logs (Nos. 501 to 526), besides numerous canes and bamboos."

It must not be supposed that because specimens were too late for the Exhibition that they were not utilized for the other distributed collections and for the descriptions given herein; on the contrary, they proved, several of them, most valuable for description, and especially those from Oudh, Sind, Gumsûr and Chittagong.

After the Exhibition collections had been despatched, by the kindness of the Superintendent of the Royal Botanic Gardens, a series of 100 Andaman Islands woods made in 1866 by Lieutenant Colonel Ford, M.S.C., at that time Superintendent of Port Blair, and which were accompanied by a carefully prepared bound catalogue, giving all the available information regarding quality and uses, was made available. This collection had been received in 1867, and, for better custody, had at that time been deposited in the Calcutta Gardens. Naturally, after ten years' storage in the moist climate of Calcutta, many of the specimens were found to be considerably damaged by decay or by the ravages of white-ants, but it was remarkable that so many species were found to be sound and to have sufficiently resisted those destructive agencies to be capable of furnishing good specimens for description and distribution. They are numbered B 2201 to B 2300, and an examination of the list

appended to this work will show what species in particular were fit for use. A small hand collection was also received from the Salem District, Madras, and a small collection of Ceylon woods was available from the Inspector General's Office. These were separately numbered and have been separately quoted.

The chief contributors of further specimens for purposes of description were Colonel Beddome, Captain Bailey, R. E., Messrs Ribbentrop, Thompson, Dodsworth, Smythies, Vincent, Johnston, Elliot, Oliver, Manson, Fuchs, Wilmot, all Forest Officers, as well as Dr. G. King and Mr. J. F. Duthie, the Superintendents of the Botanic Gardens at Calcutta and Saharunpur.

Taking all these sources together, the number of specimens named, numbered, and described reaches 2,530, belonging to 906 species and 432 genera. All the wood specimens described in this work bear a letter and a number, the numbers having been given in the order of receipt, and each number refers to the particular specimen or series of specimens cut out of one log or piece. In this way there can be no mistake, any numbered specimen can be at once compared with its description in the book by means of its number, the index of numbers, and the list of specimens at the end of the description of each species. It will be noticed that some of the serial numbers from 1 to 3636 are not represented in this work. The reason is that when the Paris Exhibition collections were numbered the specimens of dyes, fibres, manufactured articles, etc., were also included, these, or most of them, have now been omitted, as well as such of the wood specimens as were in too bad a condition for description, or regarding the correct names of which any doubt was felt.

The letter represents the region from which the specimen came. For this purpose eight regions have been established, on the principle that the forests comprised in one region should possess a similar climate and a similar flora.

The regions so established and the letters by which they are designated are—

- H The North West Himalaya comprising the mountains of that range above an elevation of 3000 feet between the Indus and the Sardar river on the Nepal frontier
- P The dry and arid region of the plains and lower hills of the Punjab, Rajputana and Sind
- O The plains and Sub Himalayan tract of the North West Provinces, Oudh and Gorakhpur ascending to 3000 feet
- C Central India the hilly country lying south of the J. mna and north of the Godavery River, and including the Vindhya and Satpura Hills as well as Orissa

- E. The North-East comprising the Himalaya from the Nepal frontier eastwards, the Khasia Hills, Assam, Cachar, Chittagong and the Sundarbans.
- D. The Dekkan, comprising the country to the south of the Godavery, and chiefly included in Madras and Mysore.
- W. The west coast of the peninsula, comprising the Western Ghâts and the country lying between them and the sea.
- B. British Burma, including the Andaman Islands.

Exception might, perhaps, be taken to some points in this classification. The flora of Chittagong is, in reality, quite as closely allied to that of Burma as to that of Northern Bengal and Assam; while that of Orissa and Ganjam (Northern Circars) might, perhaps, have more correctly been classed with the flora of the Carnatic than with that of Central India. But the classification adopted is a convenient one, and was established by Dr. Brandis after very careful consideration and discussion. And it will be seen by a reference to the accompanying map, kindly furnished by Mr. H. F. Blanford, F.R.S., Meteorological Reporter to the Government of India, that the regions which we have designated by the eight letters, whose meaning we have just described, are really the regions which represent the different zones of comparative rainfall. The map, it will be seen, is coloured in four shades from white to dark blue, representing:—

1. The *Arid Zone* with a rainfall less than 15 inches.
2. " *Dry Zone* " " of between 15 and 30 inches.
3. " *Intermediate Zone* " " 30 and 70 inches.
4. " *Moist Zone* " " of over 70 inches.

The first or *Arid Zone* covers only the north-western plains of the Punjab, Sind, and Rajputana; this, with a portion of the *Dry Zone*, to the north and east of it, constitute the region marked by the letter 'P'.

The *Dry Zone* has also two farther areas in South India, that is in India south of the latitude of  $21^{\circ}$ ; these areas, together with the portion of the *Intermediate Zone* on the east coast of the Peninsula south of the River Godavery and a narrow strip along the east of the range of the Western Ghâts, form the region which we have designated by the letter 'D'. It may, however, be remarked that Berar, from the similarity of its flora to that of the Central Provinces, is classed, though strictly speaking within the *Dry Zone*, under region 'C'.

The rest of the *Intermediate Zone*, forming quite half of the whole country, occupies a band stretching right across the head of the Peninsula, as well as a strip along the foot of the Great Himalayan Range. Though, comparatively speaking, this large area possesses a flora showing a general common likeness and similarity, yet we can easily divide it into two by considering the great sâi belt between the foot of the Hima-

laya and the Ganges as one section, and the great main belt of sál passing into teak between that river and a southern boundary approximately represented by the river Godavary, as a second. These two sections correspond to the regions represented respectively by the letters 'O' and 'C'.

The *Moist Zone*, shown in the map in dark blue, occupies two main areas *first*, the great belt of the mountain ranges of northern and north-east India from Kashmir, through Nepal, Sikkim and Assam, to Chittagong and Burma, and, *second*, the narrow belt along the western coast. This latter corresponds to the region we have marked 'W', while the former is divided into 3 sections, each having its characteristic flora. These are—

- 1 The Himalayan region from Kashmir to the boundary of Nepal at the Sarada river in longitude about 81°
  - 2 The Himalayan region from the Nepal boundary at the Mechi river in longitude nearly 88, the Assam Valley, Khasia Hills, Cachyr, and Chittagong, together with the Delta of the Ganges
  - 3 Burma including the Andaman Islands
- and are respectively represented by the letters 'H', 'E' and 'B'

So that, with trifling exceptions, the zones of rainfall and the regions represented by the letters prefixed to the numbers of the specimens agree with each other.

As far as it was published, Bentham and Hooker's "*Genera Plantarum*" furnished the order in which the families were arranged, as well as the general nomenclature of genera and species. At the time that most of the work was written (1878) the "*Genera Plantarum*" had only been published as far as the end of *Gamopetalæ*. Since then the *Apetalæ* have been completed while the *Monocotyledons* may be expected to be published before long. In almost all cases the names given in the "*Flora Indica*" have been taken, though there are a few exceptions in some of the genera in which it was considered best to use better known names, quoting always the names given in the "*Flora Indica*" as synonyms. The "*Flora Indica*" is quoted as far as the end of the second volume, that is, to the end of *Cornaceæ*. The third volume of the '*Genera Plantarum*' and the third volume of the '*Flora Indica*,' now in course of publication, have very considerably altered the genera and specific names of many of the plants whose woods are here described. To have inserted these alterations either during the course of the printing, or as '*Corrigenda*,' would have caused considerable delay, and so the text remains as it was written. But when a new edition is published very great alterations will have to be made and



especially in some of the large orders like 'Lauraceæ,' which will have to be entirely remodelled. Generally speaking, the only books regularly quoted, are—

1. Hooker's *Flora Indica*.
2. Roxburgh's *Flora Indica*.
3. Brandis' *Forest Flora of North-West and Central India*.
4. Beddome's *Flora Sylvatica of the Madras Presidency*.
5. Kurz's *Forest Flora of British Burma*.
6. Gamble's *Trees, Shrubs and Large Climbers of the Darjeeling District*.

The last-mentioned work being referred to merely as indicating that the tree in question is found in the North-East Himalaya, in the same way as Brandis' *Forest Flora* shows that the tree is found in North-West and Central India; Beddome's *Flora* that it occurs in Madras; Kurz's *Forest Flora* that it is a native of Burma.

A list of other works from which information has been drawn is appended to this introduction, and it must always be borne in mind that, excepting the actual descriptions of the woods, very little of what is here given is new, but has been compiled from all available sources of information. In this way the chief points of information here recorded under each species are—

1. The scientific name—with synonyms, so far as the six books referred to above are concerned.
2. The vernacular names—selected with as much care as possible and with the spelling given according to the most ordinary system and the pronunciation of the word.
3. The description of the wood.
4. The geographical distribution, as shortly as possible.
5. The record of all available information regarding rate of growth.
6. The results of all experiments on weight and strength that it was possible to quote.
7. The uses to which the wood and other products of the tree are generally put.
8. The list of specimens used in identification and description.

To have added also a botanical description of the plant, as is done in Mathieu's "*Flore Forestière*" would have doubtless increased the value of the work, but it would have at least doubled its size; and, in the present state of our knowledge of the Indian Flora, would have been almost impossible. Besides, as has been already explained, the number of species of which the woods have been described is only a small proportion in reality of the total number of species of woody plants inhabiting India. But some attempt has been made to notice even the species which have not been described. In some important genera, a list of known species and their geographical habitat has been given, in other genera other species of note have been mentioned, and, whenever possible, notes regard-

ing the uses and qualities of the wood and the other products of the trees so referred to have been added. One great object in having thus mentioned other species has been kept in view, *viz*, to show Forest Officers and others who may have the opportunity, *what we have not got*, and so persuade them to help, by sending to the writer or to the Forest School Museum, specimens that can be described and help at some future time in the publication of a more correct and complete description of the Indian woods than can now be attempted. In a few cases where most of the species are well known, as, for instance, the Maples, an attempt at an analytical key by which the species may be roughly determined in the forests has been given. In the French Forest Flora this has been done for all species, and the different Indian Forest Floras have similar analyses, but they are all dependent on more or less difficult botanical characters, while what we chiefly require is a series of keys which shall enable a non botanical Forest Officer to ascertain the species of the tree he meets with, by means of the more conspicuous differences in habit, bark, and leaf.

It is now necessary to explain how the descriptions of the woods were made. During the progress of the work of preparation of specimens in Calcutta, and afterwards at more leisure in Simla, the examination of the different woods and their description was made by a committee which consisted of—

- 1 Dr D Brandis FRS, CIE Inspector General of Forests
- 2 Mr J S Gamble MA Assistant to the Inspector General of Forests
- 3 Mr A Smythies, BA Assistant Conservator of Forests Central Provinces

The descriptions were usually dictated by Dr Brandis, and written down by one of the others, generally Mr Smythies, but the wood structure was examined by all three officers and discussed before the description was finally passed. The whole was gone over three or four times, and in the later examinations, when the Committee was more accustomed to the differences of structure, the generic and family characters were discussed and drawn up. Some of the later received specimens, as well as those given in 'Addenda,' were described by the writer, but on the same plan and principle as was originally adopted by the Committee.

In the description of the woods the chief characters of which note has been given are —

- 1 Size of tree
- 2 Evergreen or deciduous
- 3 Description of bark—
  - a Colour
  - b Thickness
  - c Appearance and fissures, exfoliation

## 4. Description of wood (sapwood and heartwood)—

a. Colour.

b. Hardness.

c. Grain.

## 5. Annual rings.

## 6. Pores.

## 7. Medullary rays.

8. Other characters, such as the presence or absence of concentric markings, and these characters require a short explanation.

1. *Size*.—The plants are usually described as “shrubs”, “large shrubs”, “small trees”, “trees”, “large trees”, and “very large trees”, according to general size; or as “climbing” or “straggling plants”.

2. *Evergreen or Deciduous*.—These characters are given as far as our knowledge of the trees extends, and are easily understood.

3. *Bark*.—Is described according to its colour, which usually presents some shade of grey or brown, varying into white, or red, or black; its thickness represented by the fractions of the inch; its roughness or smoothness, and the fissures and clefts into which it is cut externally; its texture whether hard or soft, papery or corky; and the way in which it exfoliates.

4. *Wood*.—The wood is described whenever possible according to both sapwood and heartwood. The *colour* is given as nearly as possible according to the shades, usually of white or brown, but varying into red, grey, yellow, purple and black. The *hardness* is given according to the different categories as “extremely soft”, “very soft”, “soft”, “moderately hard”, “hard”, “very hard”, and “extremely hard”, and in order to give an idea of these different categories we may instance the following among well-known trees:—

Extremely soft	.	.	<i>Cochlospermum Gossypium.</i>
Very soft	.	.	<i>Sterculia villosa; Bombax malabaricum.</i>
Soft	.	.	<i>Cedrela Toona; Albizzia stipulata.</i>
Moderately hard	.	.	<i>Ficus bengalensis; Tectona grandis.</i>
Hard	.	.	<i>Shorea robusta; Terminalia tomentosa.</i>
Very hard	.	.	<i>Dalbergia Sissoo; Quercus semecarpifolia.</i>
Extremely hard	.	.	<i>Pterocarpus santalinus; Hardwickia binata.</i>

The *grain* is usually recorded as being “close”, “even”, “open”, “rough”, “cross”, &c., &c., and the relative roughness or smoothness is generally given.

5. *Annual rings*.—In the description of the wood these are only referred to as regards their presence or absence, their being more or less well marked, and the marks which so distinguish them.

6. *Pores*.—As in the case of the hardness, so, too, the pores are described according to a scale of size which varies in those trees which possess them, as “extremely small”, “very small”, “small”, “moderate

sized", "large", "very large", and "extremely large" As examples of these categories may be given—

Extremely small	<i>Buxus sempervirens</i>
Very small	<i>Acer pictum</i>
Small	<i>Adina cordifolia</i>
Moderate sized .	<i>Bassia latifolia</i>
Large . . . . .	<i>Albizia Lebbek</i>
Very large . . . . .	<i>Erythrina suberosa</i> .
Extremely large	Many climbers,

7 *Medullary rays*—The classification of the medullary rays has been made upon a similar plan, and they have been divided into "extremely fine", "very fine", "fine", "moderately broad", "broad", "very broad", and "extremely broad", examples of which categories are—

Extremely fine	<i>Euonymus lacerus</i>
Very fine . . . . .	<i>Diospyros Melanoxylon</i>
Fine . . . . .	<i>Albizia Lebbek</i>
Moderately broad	<i>Dillenia pentagyna</i>
Broad . . . . .	<i>Platanus orientalis</i>
Very broad	<i>Quercus incana</i>
Extremely broad	<i>Samara robusta</i> .

In addition, the distance between the medullary rays is usually given and is compared with the diameter of the pores The medullary rays are said to be *distant* when they are further apart than twice the diameter of the pores, and in some species they are closer together than that diameter, often bending round the pores which come between them

8 *Other characters*—The most noticeable of these are the presence or absence of concentric bars across the rays, and of patches of white tissue and the way they are disposed These other characters are often valuable accessories in determining the genera, and even the family to which a wood belongs The woods of different species of ANONACEÆ are all characterised by regular ladder like transverse bars, and so far as the experience gained in the preparation of this work goes, the character affords an unmistakeable sign for recognizing the trees of that order

In SAPOTACEÆ again, the wavy concentric lines and the arrangement of the pores in short wavy lines affords a character which is almost certain, and if any doubt could arise it would be between that order and its neighbour the EBEVACEÆ, which, however, almost always differs in having the wood of a white, grey or black colour, while that of SAPOTACEÆ is generally some shade of red

Concentric lines of soft texture occur in many families and genera They are very common in the LEGUMINOSÆ, as may be seen from the description of the seven groups which the woods of that family form, as described at pages 110, 116 They occur also in *Garcinia* and *Mesua*

among GUTTIFERÆ; in *Elæodendron*, *Celastrus*, and *Lophopetalum* among CELASTRINÆ; in *Heynea*, *Amora*, and *Walsura* among MELIACÆ; *Cordia* in BORAGINÆ, and in other genera. The wood of the trees of the great and important order of CONIFERÆ is always recognizable, at any rate, by the constant character of the absence of pores; that of the CUPULIFERÆ by the arrangement of the pores in wavy, radial lines, and a particular texture; somewhat broad medullary rays often indicate the orders DILLENIACÆ, RHIZOPHORÆ, and MYRSINÆ; a close and even-grained wood, most species of the great order of RUBIACÆ; while the large genus *Ficus* has its woods extremely uniform in character and recognized by alternate layers of soft and firm tissue.

In this way a little practice enables a very near guess to be made at the scientific name of the tree which gave any wood which it may be necessary to determine, and it may be hoped that, with a rather wider acquaintance with the woods of India, we may be in a position to draw up an analytical table for the woods which are most chiefly in use in India, similar to that given at the end of the French Forest Flora.

Mention has been made of some families and genera which have woods of similar character and structure, but it is also necessary to point out that there is no regular rule for determining orders and genera by means of the wood, for in some cases the structure of the different component genera or species presents characters of a very dissimilar type. In the genus *Dalbergia*, for instance, there is a very great dissimilarity, so that while three species (see p. 124) have hard dark-coloured heavy woods, others have white, often soft, woods without heartwood, and one species has the peculiarity of a wood divided into concentric rings, which are often separable, of alternate layers of wood and bark-like tissue.

But, in general, it may be said that in the same genus the wood structure is usually constant, and in this way the character may often serve as a valuable aid in botanic investigation, as it has constantly done in palæontology.

It is not always easy to give in words an explanation of the reasons which lead one who is tolerably conversant with the structure of woods to pronounce an opinion; there are often characters of appearance, touch, colour, odour, &c., which afford clues, as well as the arrangement and relative size of the pores and medullary rays, and the presence or absence of annual rings; so that it is really only experience and habit that can teach us to recognize, from a mere inspection of a wood, the place which it ought to occupy in the natural system.

As an instance of how the structure of a wood may bear out an opinion

on generic distinction the following may be given. When describing the woods of the different species of Olive, one kind was met with which presented a structure entirely dissimilar from the rest. This was our No. E 379 which was sent, accompanied by leaf specimens, from the highest forests of Sikkim. Wishing to ascertain the name, Dr Brandis took the specimens to the Calcutta Herbarium, and after careful examination pronounced them to belong to a species of *Osmanthus*, a genus closely allied to *Olea*, and it is as *Osmanthus*, nov. sp., that the wood is described at p. 257. A few days ago, in the forest near Darjeeling the writer found trees of the well known *Osmanthus fragrans*, and on examining the wood, found that it agreed in structure with No. E 379, having the pretty network of anastomosing bands of pores, and not the more regular and uniform arrangement presented by *Olea*. So that the correctness of Dr Brandis' determination is borne out by the structure of the wood at any rate.

The examination of specimens to determine the *rate of growth* was chiefly made by Mr Smythies, assisted at one time by Dr Warth, and, in writing the account of rate of growth, reference has been made to all the information published, or otherwise obtainable, on the subject. For the principal woods some data have been procured which will doubtless be very valuable, while even the record of the countings made on our small specimens is, though not absolutely reliable, at any rate useful as a commencement. Whenever possible, countings were made on the log, on the whole diameter of the section, but time and leisure were not always available for this during the work in Calcutta, so that many of the results given are merely calculated from an inspection of such pieces as were available, and are necessarily, therefore, not completely reliable. This explanation is necessary, in order that it may be well understood, that our record is not always a record of the results of a series of carefully conducted experiments and examinations, but in many cases is only given as a beginning and as being the best information available.

The discussion of the rate of growth of teak was based on a memorandum which was published by Dr Brandis on the subject and circulated, that of sal was chiefly drawn up by Mr Smythies, and appeared first in Vol. IV, page 324, of the *Indian Forester*, the rest were drawn up by the writer. Information regarding the rate of growth of our forest trees is one of the greatest of our desiderata, as such information is essential to the determination of the rotation of forests and the construction of working plans, so that no possible opportunity should be lost of collecting information on the subject.

The rate of growth is recorded as "slow", "moderate", or "fast", according as the number of rings per inch is greater than 12, between 12 and 6, and less than 6. These correspond to ages at 6 feet in girth of 134 years, 67 to 134, and 67 years respectively.

*Weight.*—As already stated in reference to the annual rings, the experiments made with our specimens in ascertaining the specific gravity of different kinds of woods, are also merely given as being often the only information available. Most of the specimens weighed were of small size, and they were, perhaps, not always cut so as to be capable of very exact measurement, but, nevertheless, the information obtained is of value and can serve until it is supplemented or superseded by more accurate experiments made with a large choice of specimens.

The weighings were done by Mr. Smythies and Dr. H. Warth, and the result is given in the form of the number of pounds per cubic foot, as being a more easily utilized form of information than the figures representing the specific gravity, compared with that of water taken as 1. The weight here recorded is always, unless otherwise stated, that of seasoned timber, and it is given as "light", "moderately heavy", "heavy", and "very heavy" according as the woods give:—

*Light*, less than 30lbs. per cubic foot.

*Moderately heavy*, from 30lbs. to 50lbs. per cubic foot.

*Heavy*, from 50lbs. to 70lbs. per cubic foot.

*Very heavy*, over 70lbs. per cubic foot.

As in the Forest Flora of North-West and Central India, only the information regarding the *transverse strength* of timber is recorded, though in a few cases the modulus of elasticity is also given.

In regard to *transverse strength*, the value of  $P$  is the result obtained by the formula—

$$\frac{W \times L}{B \times D^3}$$

where—

$W$ —The breaking weight, or the weight which when placed on the middle of the bar causes it to break.

$L$ —the length of the bar between supports, in feet.

$B$ —the breadth of the bar, in inches.

$D$ —its thickness, in inches.

A great number of recorded experiments have been brought together, chiefly from those made by Baker, Skinner, Benson, Bennett, Dundas, and others, while in these pages are for the first time published the results of the valuable and careful experiments made in Calcutta by Dr. Brandis in 1864.

In writing the remarks on the *products* of each tree, the uses for which its wood is valuable, and the various economic purposes to which the bark, fibre, gum, fruit, leaves, &c., are put, information has been extracted from a very large series of books and papers, official documents and notes furnished by the

In fact, almost all sulted in order to make the remarks as complete as possible. But there is still much to be done, every day adds some new fact to the stores of our information regarding Indian trees, and the Departmental Reports, the *Indian Forester*, and the various publications of Government on the different subjects of economic interest, the dyes, fibres, gums, oils, &c., are constantly still increasing this information, so that before long even the more recently added items will become old in their turn. As our knowledge of Indian trees and their uses and capabilities extends, and as specimens are obtained and wood structures described, so it is hoped that facts may be collected which will enable some future Forest Officer to revise and republish this work, bringing it up to date and making more wide the area of our knowledge of the wonderful productions of the very varied forest flora of India. It may be called ambitious to attempt a description, even in the shape of a 'Pro-dromus,' of the woods of such a wide field as that of British India, but the difficulty would always be, in attempting to restrict the area, that the various floras of the different regions run so much into one another, and so often contain the same or similar species, so that it may be hoped that the publication of this work, which, except as regards the wood structure alone, is only after all a compilation, will be looked upon chiefly as an attempt to describe the principal woods of India, and in a less degree as a convenient book of reference for the native names and economic uses of Indian trees.

The Addenda Corrigenda sheets are rather lengthy, but the number of corrected mistakes is not very great, the chief reason for length being the addition of descriptions of woods lately obtained and of native names not before published. The Kol names for instance, it is believed, are herein published for the first time. These, as well as a few Oraon, Bhumij and Kharwar names, were collected by the writer in the winter of 1880-81, and he has also added a number of Uiyia names obtained in the forests of Khurda, and Magh and Bengali names obtained in Chittagong. The Mechi and Garo names attached to Mr Shakespeare's collections in the Bengal Forest Herbarium have also been added.



well as the Mysore names published recently by Major VanSomerens. Some further information regarding the rate of growth has also been given.

J. S. GAMBLE.

DARJEELING :  
*November, 1881.*

# LIST OF BOOKS AND PUBLISHED PAPERS REFERRED TO

- Anderson** An Enumeration of the Palms of Sikkim Journal of the Linnean Society of London, 1868
- An Enumeration of the Indian Species of Acanthaceæ Journal of the Linnean Society of London, 1866
- Atkinson** Economic Products of the North Western Provinces 'Gums and Gum resins' Allahabad, 1876
- Baden Powell** Hand book of the Economic Products of the Punjab, Roorkee, 1868.
- Baker** Experiments on the Elasticity and Strength of Different Kinds of Timber Gleanings in Science, 1829
- Balfour** Timber Trees of India, Madras, 1870
- Beddome** Flora Sylvatica of the Madras Presidency, Madras, 1869 73
- Report on the Nilambur Teak Plantations, Madras, 1878
- Bennett** Experiments on Andaman woods Professional Papers on Indian Engineering, Roorkee
- Bentham and Hooker** Genera Plantarum, Vols I and II
- Bidie** Report on Neelgherry Loranthaceous Plants Madras, 1874
- Brandis** Forest Flora of North West and Central India, London 1874
- List of Specimens of the Woods of British Burma sent to England for the International Exhibition of 1862, Calcutta, 1878
- Catalogue of Specimens sent to the Paris Exhibition of 1878, Calcutta, 1878
- Brandis and others** Report on the Deodar Forests of Bussahir, 1865
- Working Plan for the Bias Forests, 1871
- Working Plan for the Deoban Working Circle, 1875
- Preliminary Working Plan of the Sutley Working Circle, 1875
- Suggestions regarding the Demarcation and Management of the Forests of Kulu, 1877
- Brandis** Suggestions regarding Forest Administration in the Central Provinces, 1876
- Suggestions regarding Forest Administration in the Hyderabad Assigned Districts, 1877
- Suggestions regarding Forest Administration in Assam 1879
- Suggestions regarding Forest Administration in Ajmere and Merwar, 1879
- Cathcart and Hooker** Illustrations of Himalayan Plants, London, 1855
- Clarke** Compositæ Indiæ, Calcutta, 1876
- A Revision of the Ferns of Northern India Transactions of the Linnean Society, 1880
- Cleghorn** The Forests and Gardens of South India London, 1861
- Clifford** Memorandum on the Timber of Bengal, Calcutta, 1862
- Collins** Report on the Caoutchouc of Commerce, London, 1877
- Cooke** Report on the Gums, Resins, &c, in the India Mus.

- Cooke.** Report on the Oilseeds and Oils in the India Museum, London, 1874.
- Cunningham.** On Stone and Timber of the Gwalior Territory, Roorkee Professional Papers, 1854.
- De-Candolle.** *Prodromus Systematis Naturalis Regni Vegetabilis*, Paris, 1824-1873.  
 ———. *Monographiæ Phanerogamarum*, Vol. I, *Meliaceæ*, Paris, 1878.
- Don.** *Prodromus Floræ Nepalensis*, London, 1825.
- Drury.** *The Useful Plants of India*, Madras, 1858.
- Dundas.** Experiments made at Lucknow on the Strength of Sál and Teak Timber. Professional Papers on Indian Engineering, 1879.
- Fernandez and Smythies.** Report on the Bijeragogarh Reserved Forests, Nag-pore, 1875.
- Firminger.** *A Manual of Gardening for India*, Calcutta, 1869.
- Flückiger and Hanbury.** *Pharmacographia*, London, 1874.
- Forsyth.** *Highlands of Central India*, London, 1871.
- Gamble.** *List of the Trees, Shrubs, and Large Climbers of the Darjeeling District*, Calcutta, 1878.
- Griffith.** *The Palms of British East India*, Calcutta, 1850.
- Helfer.** *The Provinces of Ye, Tavoy, and Mergui on the Tenasserim Coast*, Calcutta, 1839.
- Hiern.** *Monograph of the Ebenaceæ*. Cambridge Phil. Soc. Transactions, 1873.
- Hill and Vincent.** *Plan of Operations for the Simla Municipal Forests*, 1876.
- Holtzapffel.** *Descriptive Catalogue of the Woods commonly employed in the Mechanical and Ornamental Arts*, London, 1852.
- Home.** Report on the Vegetation of the Andaman Islands, Calcutta, 1874.
- Hooker.** *Flora of British India*, Vols. I & II.  
 ———. *Himalayan Journals*, London, 1854.  
 ———. *The Rhododendrons of the Sikkim Himalaya*, London, 1849.  
 ——— and Baker. *Synopsis Filicum*, London, 1874.
- Hunter.** *Statistical Account of Bengal*, London, 1877.
- Keay.** *Scantlings of Timber for Flat Roofs*, Roorkee, 1872.
- King and Dey.** *A Glossary of Indian Plants*, Calcutta, 1879.
- Kurz.** Report on the Vegetation of the Andaman Islands, Calcutta, 1870.  
 ———. Preliminary Forest Report of Pegu, Calcutta, 1875.  
 ———. *Forest Flora of British Burma*, Calcutta, 1877.
- Lang.** *Indian Timber Trees*. Professional Papers on Indian Engineering.
- Laslett.** *Timber and Timber Trees*, London, 1875.
- Lewin.** *The Hill Tracts of Chittagong*, Calcutta, 1869.
- Lindley and Moore.** *Treasury of Botany*, London, 1873.
- Mathieu.** *Flore Forestière*, Paris, 1877.
- Molesworth.** *Graphic Diagrams for the Strength of Teak Beams*. Professional Papers on Indian Engineering, Roorkee.
- Munro.** *A Monograph of the Bambusaceæ*. Transactions of the Linnean Society, 1868.
- Mueller.** *Select Plants for Industrial Culture*, Melbourne, 1876.
- Newbery.** *Descriptive Catalogue of the Economic Woods of Victoria*, Melbourne, 1877.
- Ribbentrop.** *Hints on Arboriculture in the Panjab*, Calcutta, 1874.  
 ———. *Working Plan of the Kalatop Forest*, 1873.
- Roxburgh.** *Flora Indica*, Calcutta, 1832, reprint 1874.

- Royle** Illustrations of the Botany of the Himalayan Mountains London, 1839  
 ———. The Fibrous Plants of India, London, 1855
- Schlich** Report on the Pyinkado Forests of Arakan, Rangoon, 1870
- Sebert.** Notice sur les Bois de la Nouvelle Calédonie, Paris
- Skinner** Description and Strength of some Indian Timbers, Madras, 1862
- Stewart.** Punjab Plants, Lahore, 1869
- Strettell** Note on Croutchooc obtained from *Chavannesia esculenta*, Rangoon 1874
- Thompson** Report on Insects Destructive to Woods and Forests, Allahabad, 1868
- Thwaites** Enumeratio Plantarum Zeylanicæ, London, 1861
- Van Someren** List of the Forest Trees of Mysore and Coorg
- Wallich** Plantæ Asiaticæ Rariores, London, 1830  
 ———. List of Indian Woods collected by — By A Aikin Transactions of the Society of Arts 1839
- Waring** Pharmacopœia of India, London, 1868
- Watson** List of Indian Products, London, 1872  
 ———. Index to Names of Eastern Plants and Products London, 1868
- Wight** Icones Plantarum Indiæ Orientalis, Madras, 1840 1853  
 ———. Illustrations of Indian Botany, Madras 1838—53
- Also numerous papers in the *Indian Agriculturist*, *Statistical Reporter*, *Indian Forester* and other periodicals



## ADDENDA AND CORRIGENDA.

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- Page 1, last line but 6 For "H 2850" read "H 2820"
- " 2, line 7 After "Andaman," add "It has a red bark peeling off in hard flakes, light brown, moderately hard wood, with large round pores and broad medullary rays (E 3370 Kasalong Reserve, Chittagong)"
- " 2, *Dillenia indica* To vernacular names add "*Ramphal*, Nep, *Panpu*, Garo, *Betta kanagala*, *lad kanagala*, Kan, *Chilla*, Monghyr, *Oao*, Uriya,"
- " 2, line 6 from the bottom, after 'radius' add "A round (E 2310) in the Bengal Forest Museum shews 62 rings for a mean radius of  $6\frac{1}{2}$  inches, or nearly 9 rings per inch"
- " 3, line 4 Add "The leaves are said by Mr Brownlow of Cachar to be used for feeding the silkworm *Attacus Atlas*"
- " 3, *D pentagyna* To vernacular names add "*Pashkouli*, Rajbanshi, *Agar*, Monghyr, *Uchki*, Garo, *Korkot*, Oraon, *Korkotta*, Kól, *Kaltega*, *lad kanagala*, Kan,"
- " 3, *D pentagyna* To numbers add—  
"C 3571 Khurdha Forests, Orissa . . . 49 lbs."
- " 5, *Talauma Hodgsoni* To vernacular names add "*Laigongron*, Mech, *Pankakro*, Gáro,"
- " 5 *Magnolia Campbellii* Before vernacular names add "Red Magnolia" and to vernacular names add "*Patagari*, Bhutia,"
- " 6, *Michelia Cathcartii* To numbers add—  
"E 3321 Darjeeling, 6 500 ft"
- " 6, *M excelsa* To vernacular names add "*Pendre*, Lepcha,"
- " 7, line 2 After "specimens" add "Young specimens cut in the Park, Darjeeling, shew 4 to 7 rings per inch of radius, while a large round (E 3631) in the Bengal Forest Museum, having a girth of 91 inches, shows 7 rings per inch mean growth"
- " 7, *M excelsa*. To numbers add—  
"E 3586 Darjeeling 7,000 ft"
- " 7, line 18. After "growth moderate" add "6 rings per inch of radius"
- " 7, *M lanuginosa* To numbers add—  
"E 3331 Darjeeling, 6 000 ft . . . 36 lbs"
- " 9, *Polyalthia cerasoides* To vernacular names add "*San hessare*, Kan,"
- " 9 After POLYALTHIA add "C 3483, from the Kolhan Forests, Singbhúm Chota Nagpore is probably *P suberosa*, Roxb Vern *Sandi omé*, Kól Bark thick, brown Wood olive grey, hard, close grained, resembling that of *P. cerasoides*"
- " 10, *Saccopetalum tomentosum* To vernacular names add "*Omé*, *hake humú* Kól, *Hessare*, Kan,"

Page 10, *S. tomentosum*. To numbers add—

“C 3471. Saranda Forests, Chota Nagpore.”

- „ 10. After *SACCOPETALUM* above the 12th line from the bottom of the page, add—

“C 3536, from the Khurdha Forests, Orissa. Vern. *Patmossu*, Uriya, resembles the wood of *Saccopetalum tomentosum*, but is whiter. Weight, 51 lbs. per cubic foot.”

“E 3368, from the Kasalong Reserve, Chittagong, is *Unona longiflora*, Roxb. Fl. Ind. ii. 668; Hook. Fl. Ind. i. 61; Kurz i. 35, a small tree of Assam, the Khasia Hills, and Chittagong. Bark greenish-grey, thin, smooth. Wood yellowish white, moderately hard, close-grained. Pores small, scattered, scanty. Medullary rays moderately broad, joined by numerous white transverse bars.

“B 3380, from the hills to the east of Toungoo, British Burma, is *Mitrephora vandaeiflora*, Kurz i. 45, a tree of the forests of Chittagong and Pegu, but chiefly found in the Martaban Hills. The wood is grey, moderately hard. Pores small to moderate-sized, not numerous. Medullary rays moderately broad, joined by numerous, regular, white transverse bars.

“E 3300, from Chunbati, Darjeeling, 2,000 ft., is *Goniothalamus sesquipetalis*, Hook. f. and Th.; Hook. Fl. Ind. i. 73; Kurz i. 41; Gamble 3. Vern. *Sané*, Nep.; *Singnok*, Lepcha, a small shrub of the Eastern Himalaya down to Burma. Bark black. Wood dark grey, soft. Pores extremely small. Medullary rays fine to moderately broad, wavy. Transverse bars very numerous, very fine.”

- „ 11, line 5. After “B 273.” add “B 276.”

- „ 13, „ 26. For “52 lbs.” read “55 lbs.”

- „ 13, „ 29. For “Naghandia” read “Nagkanda”

- „ 15. After “2. *C. aphylla*” add—

“3. *C. horrida*, Linn. f.; Hook. Fl. Ind. i. 178; Brandis 15; Kurzi. 62. *C. zeylanica*, Roxb. Fl. Ind. ii. 567. Vern. *His*, *karvila*, Pb.; *Karralura*, Oudh; *Adonda*, Tel.; *Katerni*, Gondi; *Gitoran*, Ajmere; *Bagnai*, Monghyr; *Atanday*, Tam.; *Oserwa*, Uriya.

“A climbing thorny shrub. Bark  $\frac{1}{4}$  inch thick, brown, rough. Wood yellowish white, moderately hard. Pores small to moderate-sized, scanty. Medullary rays moderately broad, not numerous, short. Faint, wavy, concentric lines of soft tissue.

“Most parts of India and Burma.

“P 3244. Ajmere . . . . . 47 lbs.

“4. *C. multiflora*, Hook. f. and Th.; Hook. Fl. Ind. i. 178; Kurz i. 61; Gamble 5. Vern. *Suntri*, Nep.

“A climbing thorny shrub. Bark smooth, dark. Wood white, moderately hard. Pores small, scanty. Medullary rays short, fine, Faint concentric lines of softer texture.

“Eastern Himalaya, Upper Burma.

“E 3349. Nagri, Darjeeling, 4,000 ft.

“5. *C. olacifolia*, Hook. f. and Th.; Hook. Fl. Ind. i. 178; Gamble 5. Vern. *Naski*, *hais*, Nep.; *Jhenok*, Lepcha.

“A thorny shrub. Bark  $\frac{1}{4}$  inch thick, brown, rough, corky. Wood white, hard. Pores small, often subdivided, or in radial lines. Medullary rays fine, very numerous.

“Sub-Himalayan tract from Nepal to Assam, chiefly in the undergrowth of Sissú forests, along rivers.

“E 3297. Balasun, Darjeeling Terai . . . . . 44 lbs.

"6. *C. sepriaria*, Linn, Hook Fl Ind 1 177, Brandis 15, Roxb Fl Ind 11 563, Kurz 1 66 Vern *Huan ganna*, Pb, *Kanti kapali*, Uriya

"A shrub Bark brown,  $\frac{3}{4}$ th inch thick Wood white, hard Pores moderate sized, scanty Medullary rays short, fine Faint, white, concentric bands

"Dry places in India and Burma

"P 3242 Ajmere

"C 3580, from Khurdha, Orissa, is this species The wood resembles that of the Ajmere specimen, but the medullary rays are moderately broad and longer

Page 15, *Crataeva religiosa* To vernacular names add "*Thiladu*, *bunboronda*, *Mechi*, *Nirujani*, *Coorg*,"

" 16, line 22 For "moderately fine" read "moderately broad

" 16, " 32 After '*Latkan*,' add "*nathana*,"

" 16, " 33 After "*Kuppa mankala*," add "*rangamali*,"

" 16, " 13 from the bottom. Add after "*Nilgnis*" "*Sanna solti*, *Hassan*,"

" 16, " 7 from the bottom Before "*Flacourtia*" add "*Bixa*,"

" 16, last line but one. For "*Kuntto*" read "*Kunth*"

" 17, *Cochlospermum Gossypium* To vernacular names add "*Hupu*, *Kol*, *Betta toware*, *Kan*, *Konto palas*, *Uriya*,"

" 17, line 17 After "*Burghers*," add "*Dodda jepalu*, *Kan*

" 18, *Flacourtia Ramontchi*. To vernacular names add '*Serali*, *merlo*, *Kol*, *Katali*, *Palamow*, *Bali baincho*, *Uriya*, and to numbers add "C 3453 *Saidope Reserve*, *Palamow*, *Chota Nagpore*, and "C 3488 *Kolhan Forests*, *Singbhum*, *Chota Nagpore*'

" 18, at the end of *FLACOURTIA* after line 18 add "C 3519, from the *Khurdha Forests*, *Orissa*, is *Flacourtia sepriaria*, *Roxb* Vern *Baincha*, *bainch koli*, *Uriya* Bark yellowish red, thin Wood light red, hard, close and even grained Pores very small in radial lines between the very fine, uniform, closely packed, wavy medullary rays"

" 18, line 31 For "H 2947. read "H 2949

" 18, line 32 After "*Assam*" add "*Chota Nagpore*"

" 18, at the bottom of the page, add "*P. ...* of *Bixa Orellana*, *Linn* white, soft, even grained. 3 to 6, prominent on a vert packed, bent round the pores or groups of pores, so that the distance between the rays is less than the transverse diameter of the pores Annual rings marked by a line without pores Growth moderate 5 rings per inch of radius"

" 19, Order XI *POLYGALAE* At the end add "No E 3393 is *Polygala arillata*, *Ham*, from *Jalapahar*, *Darjeeling*, 7,500 ft It has a thin grey bark, and white, soft wood Pores small, arranged in radial, or sometimes oblique, lines or patches Medullary rays fine, scanty Annual rings distinct

" 20, heading For "*Tamarix*" read "*Tamarix*

" 21, line 11 from the bottom After "*Kirballi*" add "*ballagi*,"

" 23, " 22 After "*Mataw*, *Burm*" add "*Divarige*, *Kan*,"

" 24, *Garcinia Cambogia* To vernacular names add "*Manthulli*, *Kan*

" 24, *G. Morella* To vernacular names add "*Kankutake*, *Kan*,"

" 21 After "4 *G. Morella*" above line 8 from the bottom, add—

"5 *G stipulata* T And, Hook Fl Ind 1 267, *Gamble* 7 Vern *Sanakadan*, *Lepcha*



Page 10, *S. tomentosum*. To numbers add—

“C 3471. Saranda Forests, Chota Nagpore.”

- „ 10. After *SACCOPETALUM* above the 12th line from the bottom of the page, add—

“C 3536, from the Khurdha Forests, Orissa. Vern. *Patmossu*, Uriya, resembles the wood of *Saccopetalum tomentosum*, but is whiter. Weight, 51 lbs. per cubic foot.”

“E 3368, from the Kasalong Reserve, Chittagong, is *Unona longiflora*, Roxb. Fl. Ind. ii. 668; Hook. Fl. Ind. i. 61; Kurz i. 35, a small tree of Assam, the Khasia Hills, and Chittagong. Bark greenish-grey, thin, smooth. Wood yellowish white, moderately hard, close-grained. Pores small, scattered, scanty. Medullary rays moderately broad, joined by numerous white transverse bars.

“B 3380, from the hills to the east of Toungoo, British Burma, is *Mitrephora vandaeiflora*, Kurz i. 45, a tree of the forests of Chittagong and Pegu, but chiefly found in the Martaban Hills. The wood is grey, moderately hard. Pores small to moderate-sized, not numerous. Medullary rays moderately broad, joined by numerous, regular, white transverse bars.

“E 3300, from Chunbati, Darjeeling, 2,000 ft., is *Goniothalamus sesquipetalis*, Hook. f. and Th.; Hook. Fl. Ind. i. 73; Kurz i. 41; Gamble 3. Vern. *Sané*, Nep.; *Singnok*, Lepcha, a small shrub of the Eastern Himalaya down to Burma. Bark black. Wood dark grey, soft. Pores extremely small. Medullary rays fine to moderately broad, wavy. Transverse bars very numerous, very fine.”

- „ 11, line 5. After “B 273.” add “B 276.”

- „ 13, „ 26. For “52 lbs.” read “55 lbs.”

- „ 13, „ 29. For “Naghandia” read “Nagkanda”

- „ 15. After “2. *C. aphylla*” add—

“3. *C. horrida*, Linn. f.; Hook. Fl. Ind. i. 178; Brandis 15; Kurzi. 62. *C. zeylanica*, Roxb. Fl. Ind. ii. 567. Vern. *His*, *karvila*, Pb.; *Karralura*, Oudh; *Adonda*, Tel.; *Katerni*, Gondi; *Gitoran*, Ajmere; *Bagnai*, Monghyr; *Atanday*, Tam.; *Oserwa*, Uriya.

“A climbing thorny shrub. Bark  $\frac{1}{4}$  inch thick, brown, rough. Wood yellowish white, moderately hard. Pores small to moderate-sized, scanty. Medullary rays moderately broad, not numerous, short. Faint, wavy, concentric lines of soft tissue.

“Most parts of India and Burma.

“P 3244. Ajmere . . . . . 47 lbs.

“4. *C. multiflora*, Hook. f. and Th.; Hook. Fl. Ind. i. 178; Kurz i. 61; Gamble 5. Vern. *Suntri*, Nep.

“A climbing thorny shrub. Bark smooth, dark. Wood white, moderately hard. Pores small, scanty. Medullary rays short, fine. Faint concentric lines of softer texture.

“Eastern Himalaya, Upper Burma.

“E 3349. Nagri, Darjeeling, 4,000 ft.

“5. *C. olacifolia*, Hook. f. and Th.; Hook. Fl. Ind. i. 178; Gamble 5. Vern. *Naski*, *hais*, Nep.; *Jhenok*, Lepcha.

“A thorny shrub. Bark  $\frac{1}{4}$  inch thick, brown, rough, corky. Wood white, hard. Pores small, often subdivided, or in radial lines. Medullary rays fine, very numerous.

“Sub-Himalayan tract from Nepal to Assam, chiefly in the undergrowth of Sissú forests, along rivers.

“E 3297. Balasun, Darjeeling Terai . . . . . 44 lbs.



"A tree with brown bark. Wood light orange-yellow, moderately hard, close-grained. Pores moderate-sized, sometimes subdivided. Medullary rays moderately broad, numerous. Numerous wavy concentric bands of soft texture, and of colour lighter than the rest of the wood, across the rays, and often anastomosing.

"Sikkim and Bhutan in damp forests up to 4,000 ft.

"The fruit is yellow and sometimes eaten by Lepchas. It gives a yellow gum, chiefly from the fruit, but it does not seem to be used.

"E 3352. Kalimpong, Bhutan, 4,000 ft.

"E 3365 is a specimen of the wood of a *Garcinia* from Burkhal, Chittagong Hill Tracts. Bark thin, brown. Wood reddish white, moderately hard. Pores large, scanty, often subdivided. Medullary rays fine to broad. Numerous, wavy, concentric bands of soft tissue across the rays."

Page 25, line 16. For "are found" read "they are found"

„ 25, *Calophyllum inophyllum*. To vernacular names add "*Pinekai*, Kan.; *Poonang*, Uriya;"

„ 25, line 10 from the bottom. Add "Sebert in 'Les Bois de la Nouvelle Calédonie' says it is a magnificent wood for cabinet-maker's work, and that it gives a yellowish green, pleasantly scented resin. He gives the mean specific gravity as 0.924, equivalent to nearly 59 lbs. per cubic foot. In Orissa it is much cultivated, and an oil extracted from the seeds is used for burning."

„ 26, *C. tomentosum*. To vernacular names add "*Kuve*, *bobbi*, Kan.;"

„ 26, line 15. After "per cubic foot," add "Molesworth in 'Graphic Diagrams for Strength of Teak Beams' gives: Weight, 37 lbs.,  $P = 640$ ,  $E = 3,500$ ."

„ 27, *Mesua ferrea*. To vernacular names add "*Nahsher*, Mechi; *Kesara*, Kan.;"

„ 27, line 9. After "evergreen tree." add "Bark  $\frac{1}{4}$  inch thick, reddish brown, peeling off in flat thin flakes, leaving a slightly roughened surface."

„ 27, line 26. After "cubic foot in weight." add "Molesworth in 'Graphic Diagrams for Strength of Teak Beams' gives: Weight, 71 lbs.,  $P = 1,040$ ,  $E = 6,000$ ."

„ 27, at the end of *MESUA*, add "C 3513 and C 3524 (55 lbs.), from Kohori, Khurdha, Orissa, where the tree was planted on an area of about 12 acres by a former Raja of Khurdha, are *Ochrocarpus longifolius*, Bth. and Hook. f. Vern. *Chhuriana*, Uriya. Bark reddish brown,  $\frac{1}{4}$  inch thick, exuding a red gum. Wood red, hard, close- and even-grained. Pores moderate-sized. Medullary rays moderately broad, very numerous, the distance between them equal to, or less than, the diameter of the pores. Annual rings marked by a darker line. Lines of soft texture numerous, but indistinct. Numerous resin-ducts in radial long cells, which appear as shining lines on a horizontal, and black points on a vertical transverse section. Growth moderate, 8 rings per inch of radius. Weight, 55 lbs. per cubic foot."

„ 28, line 25. For "Bhutan Himalaya." read "Sikkim and Bhutan Himalaya."

„ 28, line 10 from the bottom, Add "Growth moderate, 7 rings per inch of radius."

„ 29, line 15. After "*Ouli gogen*, Nep.;" add "*Laidonto*, Mechi;"

„ 29, at the end of 1. *S. napaulensis*, add—

"2. *S. Roxburghii*, Wall.; Hook. Fl. Ind. i. 287; Kurz i. 103; Gamble 8. *Ternstroemia serrata*, Roxb. Fl. Ind. ii. 521. Vern. *Dahip*, Sylhet; *Ouli gogen*, Nep.; *Dangsipha*, Lepcha; *Laidonto*, Mechi.

"A small tree Bark thin, reddish brown Wood reddish brown, soft, with large central pith Pores small, very numerous Medullary rays fine, very numerous and closely set

"Eastern Sub Himalayan tract, Khasia Hills, Eastern Bengal and Burma.

"E 3271 Borojhar Reserve, Western Duars 42 lbs "

Page 29, *Schima Wallichii* To vernacular names add "*Singbrang*, Lepcha, *Gugera*, Garo, *Gogra*, *phulgogra*, Mechi, *Sangraban*, Magh, *Sambaw*, Arracan,

" 30, *S Wallichii* To numbers add—

"E 3602. Sivoke Forests, Darjeeling Terai . . 41 lbs "

" 30, line 9 After "demand" add "Hooker in Himalayan Journals : 157, says that it is much prized for ploughshares and other purposes needing a hard wood "

" 30, lines 16 and 17 from the bottom. For "Bark thin ' read "Bark very thin ' and for "Wood grey, soft, even grained read "Wood pink, moderately hard, close and even grained."

" 30, *Camellia drupifera* To list of numbers add—

"E 3358 Sivoke Hills, Darjeeling, 1,500 ft 60 lbs."

" 30, last line For "3142' read "3143'

" 32, line 28. After "*Guga*," add "*walivara*,"

" 32, last line but one After "No 63,' add "(marked *D alatus*, which however is not the 'Eng' tree, as this is)"

" 34, line 13 For "Medullary rays fine, broad read "Medullary rays fine to broad

" 34, *Shorea robusta* To vernacular names add "*Saryum* Kol, *Sargi*, Bhumij, *Sakwa*, Kharwar, *Sekwa*, Oraon, *Shal*, Beng, "

" 36, above line 12 from the bottom, insert "Recent countings made in the forests of Chota Nagpore shew that the rate of growth in Saranda may be taken at 7 to 9 rings per inch for trees growing in good soil in sheltered localities, and 12 to 15 rings for trees in more exposed conditions (*Indian Forester*, Vol VI, p 318) Small trees counted in Orissa gave the very good rate of 3 rings per inch Countings of rings on rounds in the Bengal Forest Museum, cut in the Dulka Jhar Reserve, shew as follows —

No	Rings	Radius
E 3626	47	8 5 inches
E 3627	42	8 0 "
E 3628	53	8 5 "
E 3629	70	9 0 "
E 3630	57	8 0 "

or an average of 6.2 rings per inch of radius No E 3617 from Sivoke and E 3616 from Bamunpokri, both rounds, give the first 7, the second 5.7 rings per inch, so that the Sikkim Terai sal seems to have a similar rate of growth to that of Oudh

" 36, last line but one After "being 790 add "Molesworth in 'Graphic Diagrams for Strength of Teak Beams' gives Weight, 60 lbs, P = 926, E = 4800

" 37, in schedule of experiments After "Cunningham" last line but two, add—

"Dundas	1877	Oudh	12	10' x 4 x 6	59	651 E = 2500
Thornhill	1846	Total of N W P and Oudh	39	2 x 1 x 1"	"	664
				Various	"	710

" 38, line 13 After "now available," add "(A tree, measured in the Valley of the Great Rangit, Darjeeling gave girth at 4 ft. from the ground 128 inches, height 161 feet, height to first branch, 86 feet)

Page 38, in list of numbers. For "O 388" read "O 386, 387, 388, 390."

„ 38. After C1235 add—

- "C 3434. Kumandi Reserve, Palamow.
- "C 3440. Neturhát, Palamow.
- "C 3441. Chaupi „
- "C 3444. Henar „
- "C 3472. } Rongo, Saranda, Singbhúm.
- "C 3473. }
- "C 3478. } Ankua Hill, Saranda { 2,700 feet.
- "C 3479. } { 2,000 „
- "C 3480. } { 1,800 „
- "C 3490. Kolhán Forests, Singbhúm.
- "C 3556. Khurdha Forests, Orissa . . . 45 lbs.
- "C 3516. „ „
- "E 3385. Berhampore Forest, Rungpore, Bengal 80 lbs.

and after "E 2322" add—

- "E 3616, 3618. Bamunpokri, Darjeeling, 1,000 ft.
- "E 3624 to E 3630. Dukka Jhur, Darjeeling Terai 57 lbs. (E3625)
- "E 3589. Sivoke Forests, Darjeeling Terai . . 47 lbs.
- "E 3617. „ „
- "E 3390. Dhupguri, W. Duars. „

„ 39, at the end of *S. siamensis*, add—

"7. *S. assamica*, Dyer; Hook. Fl. Ind. i. 307. Vern. *Makai*, Ass.

"A large tree. Wood brown, moderately hard. Pores large, sometimes surrounded by a ring of lighter tissue. Medullary rays fine to moderately broad, short, the distance between them equal to the diameter of the pores.

"Upper Assam.

"The wood, according to Mr. Mann, is used for planking and for making canoes.

"E 3369. Makum, Assam."

„ 40, line 27. For "Bennett in 1872, No. 5, Andaman Wood, gave 58 lbs., P = 737" read "Bennett in 1872, No. 5, three experiments with Andaman wood 3' x 1½" x 1½" gave 58 lbs., P = 711."

„ 42, „ 17 from the bottom. After "Beng.;" add "*Múoh*, Gáro; "

„ 42, „ 10 from the bottom. After "*Juwa*, oru, Beng.;" add "*Daswála*, Kan.;"

„ 43, „ 2. Add "Sebert in 'Les Bois de la Nouvelle Calédonie' says it is used at Tahiti for planking and building light boats."

„ 43. After line 4 add "E 3289, from the Rinkheong Reserve, Chittagong, is the wood of *H. macrophyllus*, Roxb. A small tree. Bark ¼ in. thick, light brown, fibrous, rather smooth. Sapwood white, heartwood light, purplish brown, soft, even-grained. Pores large, somewhat scanty, often subdivided. Medullary rays fine but clearly marked, unequally distributed, short. Annual rings marked by fewer pores in the autumn wood. Growth fast, 3 rings per inch of radius."

„ 43, line 8. After "(Wallich);" add "*Reké*, Kól;"

„ 43, *Thespesia populnea*. To vernacular names add "*Asha*, *hurvashi*, Kan.; *Bugari*, Hassan; "

„ 43, line 23. Add "Sebert in 'Les Bois de la Nouvelle Calédonie' gives the weight at 42 lbs. per cubic ft."

„ 43, *Kydia calycina*. To vernacular names add "*Moshungon*, Meechi; *Bitha gonyer*, Kól; *Derhi*, Kharwar; *Kunji*, Gondi; *Bende-náru*, Kan.;"

„ 44, *Bombax malabaricum*. To vernacular names add—

"*Panchu*, Gáro; *Dél*, Kól; *Búrqa*, Kan.;"

Page 44, *B malabaricum* To numbers add—

"E 3606 Sivoke Forests, Darjeeling Terai "

, 44, line 16 from bottom. After "cuttings" add "C 978 is a fine specimen of the fibre sent from Berar and capable of being used for rough paper"

45, last line but one. After "Dodeli, Kan," add "Bara laiphanzeh, Mechi,"

, 46, *Sterculia urens* To vernacular names add "Keonge, Manbhūm, Teley, Kól, Mogul, karaunjs, Monghyr," and to numbers add—

"C 3436 Kumandi Reserve, Palamow, Chota Nagpore "

„ 46, *S villosa* To vernacular names add "Sisi, walkóm, Kól, Pironja, Mundari, Sisir, Oraon,"

„ 47, *S colorata* To vernacular names add "Sisi, Kól, Lersima, Kharwar,"

, 49, *Helicteres Isora* To vernacular names add "Ainthia dhamin, Monghyr, Renta, sakomsing, Kól, Aiteni, Kharwar, Muri muri, Uriya,"

„ 49, *Pterospermum acerifolium* To vernacular names add "Laidar, Mechi," and change "Mús, Beng" to "Mus, Beng"

„ 49, *P acerifolium* To numbers add—

"E 3596 Sivoke Forests, Darjeeling Terai . 46 lbs "

„ 50 *P. suberifolium* To vernacular names add "Giringa Uriya, and to numbers add "C 3523, C 3534 Khurda Forests, Orissa

„ 50 *Eriolana Hookeriana* To vernacular names add "Bundun, oit bulung, Kol, Ponra, Oraon,"

, 51, line 8 For "C 3791" read "C 3191, and after it add "C 3437 Kumandi Reserve, Palamow, Chota Nagpore

„ 52, „ 7 After "Chowra," add 'kadu-bende,'

, 52, „ 31. After "markets" add 'It is also cut up into thin planking and exported to Assam to make tea boxes

„ 52, *Pentace burmanica* To numbers add "B 2915. Burma

„ 53 In strength schedule, column 'Year,' last line but one, after "A. Mendis, No 33" add "1855"

„ 53, first line after schedule After "probably this" add "Molesworth gives Weight 50 lbs, P = 844 E = 3,000

„ 53, *Berrya Ammonilla* To list of numbers add—

"No 33 Ceylon collection . 48 lbs

„ 54, first line After "Tel," add "Balmengo, Gáro, Kokársida, Mechi,"

„ 54, *Grewia tiliaefolia* To vernacular names add "Tarada, Madura,

„ 55, *G salviaefolia* To vernacular names add "Bursu, nta pelu Kól" and to numbers add "C 3457. Barasand Reserve, Palamow, Chota Nagpore "

„ 55, *G vestita* To vernacular names add "Perskuayelah, Mechi,"

, 56, *G. pilosa* To vernacular names add "Bhorkund, Monghyr," Gursikri, Kharwar,

„ 56, at the end of *G* a small  
tree from resembles  
the wood ur of the  
latter .

„ 56, „ 18 After "Bany, Nep," add "Saimuladdi, Mechi,"

„ 57, „ 16 After "Rudrak, Hind," add "Dandla, Mysore,"

„ 58, *Erythroxylon monogynum* To vernacular names add "Devaddrum, Kan,"

„ 58, line 22 After "boats" add "Dr Bidie says that 'During the Madras famine the leaves were largely eaten by the starving poor, and as there is nothing in them structurally likely to satisfy the pangs of hunger, it seems probable that they contain some principle like that of *E. Coca*'"

- Page 58, line 21 from the bottom. After "Beng.;" add "Boromali, Uriya;"
- " 58, " 9 from the bottom. After "Beng.;" add "Kiranelli, Kan.;"
- " 59, " 5. For "*Bönninghan senia*" read "*Bönninghausenia*"
- " 59, " 7. For "*Xanthorylea*" read "*Zanthorylea*" and for "*Xanthoxylum*" read "*Zanthoxylum*"
- " 59, " 19. After "Loajam," add "holholi"
- " 59, " 20. After "Burma." add "Kyd gives: Weight 36 lbs., P= 267."
- " 59, " 22. After "Hind.;" add "Chouldua, Uriya; Laker-konta, Monghyr;"
- " 59, " 38. After "Kawat, Mar.;" add "Naibela, Kan.;"
- " 59, " 46. After "Suntala, Nep.;" add "Shoungpang, Magh.;"
- " 60, " 28. For "pael" read "pale"

Pages 60, 61. For the whole of 2. *XANTHOXYLUM*, Linn. substitute the following:—

## "2. *ZANTHOXYLUM*, Linn.

"Contains 10 small, rarely large trees or climbing shrubs, usually armed with strong prickles. Besides the species here described *Z. tomentellum*, Hook. Fl. Ind. i. 493, is a small tree of the Eastern Himalaya. *Z. khasianum*, Hook. f., of the Khasia Hills and *Z. tetraspermum*, W. & A. of the Western Ghâts, are prickly climbing shrubs. *Z. Rhetsa*, DC.; Hook. Fl. Ind. i. 495; Beddome xli (*Fagara Rhetsa*, Roxb. Fl. Ind. i. 417) Vern. *Rhêtsa, mân*, Tel.; *Tessal*, Mar.; *Rattu kina*, Cingh., is a large tree of Southern India. *Z. Andamanicum*, Kurz. i. 181, is a straggling shrub of the Andaman Islands.

"1. *Z. alatum*, Roxb. Fl. Ind. iii. 768; Hook. Fl. Ind. i. 493; Beddome xlii; Brandis 47; Gamble 14. Vern. *Timbûr, timur, tezmal, dûrmûr*, Hind.; *Balay timur*, Nep.; *Gaira*, Monghyr; *Sungrû*, Lepcha.

"A shrub or small tree. Bark corky, young stems with thick conical prickles from a corky base. Wood close-grained, yellow, Pores small, often in radial lines, not uniformly distributed; belts with numerous pores often alternating with belts with scanty pores. Medullary rays fine, short, very numerous.

"Outer Himalaya from the Indus to Bhutan, ascending to 7,000 ft.; Khasia Hills.

"The wood is used for walking-sticks, the branches for making tooth-brushes. The fruit is a remedy for toothache and is also used to purify water and as a condiment. The whole plant has a strong unpleasant aromatic smell.

"H 107. Bhajji, Simla, 4,000 ft. . . . 46 lbs.

"E 2329. Tukdah, Darjeeling, 5,000 ft. . . . 34 "

"2. *Z. acanthopodium*, DC.; Hook. Fl. Ind. i. 493; Kurz i. 181; Gamble 14. Vern. *Bogay timur*, Nep.

"A small tree. Bark  $\frac{1}{8}$  inch thick, greyish brown, shining, studded with the large conical corky bases of the prickles which fall off as the tree grows. Wood yellowish white, soft. Pores small, often in short radial lines. Medullary rays fine, numerous.

"Outer Himalaya from Kumaun to Sikkim, and the Khasia Hills, up to 7,000 ft.

"A common small tree in second growth forest. Growth fast, our specimen (a round) shews 11 rings on a mean radius of  $2\frac{1}{2}$  inches, or 4.4 rings per inch of radius.

"E 3415. The Park, Darjeeling, 6,500 ft.

"3. *Z. oxyphyllum*, Edgew.; Hook. Fl. Ind. i. 494; Gamble 14. Vern. *Timur*, Nep.

"A climbing shrub. Bark greyish brown, covered with large corky lenticels, and armed with recurved thorns on a conical corky base, often  $\frac{1}{2}$  inch high. Wood yellowish white, soft, porous. Pores large, usually many times subdivided radially. Medullary rays moderately broad, bent where they pass the pores. Annual rings marked by a white line.

"Himalaya from Garhwal to Bhutan, from 6 000 to 8,000 ft, Khasia Hills, 4 000 to 6,000 ft

"E 3375 Darjeeling, 6,500 ft

"4 *Z. Hamiltonianum*, Wall, Hook. Fl. Ind. 1 494, Kurz 1 181, Gamble 14 Vern *Purpuray timur*, Nep

"A climbing thorny shrub. Bark dark grey with white lenticels, armed with short recurved prickles on a thick, nearly cylindrical corky base, often  $\frac{1}{2}$  inch high. Wood yellowish white, soft. Pores fine, not numerous. Medullary rays fine to moderately broad, numerous, nearly equidistant.

"Sikkim and Assam

"E 3416. The Park, Darjeeling 6,500 ft.

"5 *Z. Budrunga*, DC, Hook. Fl. Ind. 1 495, Kurz 1 182, Vern *Brojonali*, Ass, *Mayaning*, Burm

"A tree with greyish brown bark, young stems covered with thick conical prickles from a corky base. Wood moderately hard, close grained, white. Pores small, uniformly distributed, often in short radial lines. Medullary rays fine, short, numerous.

"Eastern Himalaya, Khasia Hills, Eastern Bengal and Burma.

"E 3324 Pankabari, Darjeeling 2,000 ft.

"6. *Z. ovalifolium*, Wight, Hook. Fl. Ind. 1 492, Beddome xli, Gamble 13

"A shrub. Bark thin, grey brown, with white vertical streaks. Wood light yellowish white, very hard, close grained. Pores very small, rather scanty, evenly distributed. Medullary rays fine, very numerous. Numerous sharp, white, concentric lines, as in *Murraya exotica*, which it much resembles in structure.

"Eastern Himalaya, Khasia Hills, Assam and the Western Ghâts

"E 3353 Sivoke Hills, Darjeeling, 1,500 ft. 54 lbs."

Page 61, Heading For "*Xanthoxylum*" read "*Zanthoxylum*,"

„ 61, *Toddalia aculeata* To vernacular names add "*Tundupara*, Uriya,"

„ 61, *Skimmia Laureola*. To numbers add "E 3293 Mahalderam, Darjeeling, 7,000 ft"

„ 61, line 14 from the bottom For "6" read "5"

„ 61, lines 13 to 7 from the bottom Strike out and add at the end of *M. exotica* on page 62 the following

"2. *M. Konigii*, Spr., Hook. Fl. Ind. 500 Brandis 48, Kurz 1 190,

Roxb. Fl. Ind. 375 Vern

*katum*, Hind, *Barsanga*,

Banda, *Humwah*, Mechi, *Karsepak*, *kari-vepa*, Tel, *Kamicepila*, Tam, *Kari bevu*, Kan

"A small tree. Bark grey with shallow netted fissures. Wood greyish white, hard. Pores small, sometimes subdivided or arranged in short radial lines. Medullary rays fine, very numerous. Concentric white lines less strongly marked than in *M. exotica*.

"Outer Himalaya from the Ravi to Assam, Bengal, South India and Burma. The wood is durable and is used for agricultural implements. The leaves are used to flavour curries.

"O 3265 Saharanpur 43 lbs"



Page 62, *Murraya exotica*. To numbers add "C 3495. Kollán Foresta, Singbhúm, Chota Nagpore."

„ 62, line 12. For "5" read "6"

„ 62, *Atalantia monophylla*. To vernacular names add "Narguni, Uriya;" and to numbers add "C 3515. Khurdha Forests, Orissa."

„ 62, *Feronia Elephantum*. To vernacular names add "Vellam, Madura;"

„ 63. *Ægle Marmelos*. To vernacular names add "Maika, Gondi; Lohagasi, Kól; Aurelpang, Magh;"

„ 63. At the end of 8. *Aeglo*. After "soft tissue." add—

"E 3295 is *Paramignya monophylla*, Wight, from Babookhola, Darjeeling, 4,000 ft. Bark white, corky, vertically cleft. Wood white, hard, close-grained. Pores very small to moderate-sized. Medullary rays very fine, extremely numerous. Prominent, sharp, white, concentric lines at unequal distances and often joining each other.

"E 3371 is the Orange, *Citrus Aurantium*, Linn. from Rajabhatkhawa, W. Dúars. Bark thin, greenish grey. Wood yellowish white, moderately hard, close and even-grained. Pores small, scanty, joined by concentric patches of white colour, which occasionally join, forming concentric circles. Medullary rays fine, very numerous, equidistant.

"E 3348 is the Lime, *Citrus medica*, L., from Darjeeling. Bark yellowish white, thin. Wood white, moderately hard. Pores small, numerous, often subdivided or in short radial lines. Medullary rays fine, very numerous. Concentric white lines distant. Pores often joined by white concentric patches.

"E 3284 is *Glycosmis pentaphylla*, Correa, from Chittagong. Bark light greyish-yellow. Wood white, hard, close-grained. Pores small, sometimes subdivided or arranged in radial lines. Medullary rays fine, wavy, very numerous. Sharp concentric white lines, often running into each other, very prominent.

"E 3355 is *Micromelum pubescens*, Bl., from the Teesta Valley, Darjeeling. Bark thin, white. Wood yellowish white, hard, close-grained. Pores small, scanty, often subdivided. Medullary rays fine, sharply marked. Sharp white concentric lines, often running into each other, prominent.

"E 3354 is *Clausena excavata*, Burm., from Siroke, Darjeeling Terai. Bark thin, smooth, dark brown. Wood white. Pores small, scanty. Medullary rays very fine, very numerous. White concentric lines often interrupted, but very closely packed radially.

"C 3530 and C 3570 are *Limonia acidissima*, Linn. Vern. *Bhenta*, Uriya, from the Khurdha Forests, Orissa. It has a thin, light-brown bark, and very hard, yellowish-white wood. The pores are small, surrounded by white tissue, solitary or arranged in oblique strings. Medullary rays very fine, numerous, uniform and equidistant. Annual rings marked by a white line. Growth moderate, 8 rings per inch of radius. Weight, 59 lbs. per cubic foot."

„ 64, *Ailanthus malabarica*. To vernacular names add "Mandadúpa, Hassan;"

„ 64, *A. excelsa*. To vernacular names add "Mahanim, Uriya; Ghorkaram, Palamow;" and to numbers add "C 3449. Betlah Reserve, Palamow, Chota Nagpore."

„ 64, line 24. After "tree." add "Bark light greyish-brown, fibrous, rough."

„ 65, line 12 from the bottom. For "Komari" read "Koniari," and at line 5 from the bottom add—

"C 3541. Khurdha Forests, Orissa . . . 46 lbs."

„ 67, line 3. For 'Knkar' read 'Kankar'

„ 67, *Garuga pinnata*. To vernacular names add "Nia jowa, Kól; Kékur, Kharwar; Karúr, Bhumij; Gharri, Gondi;"

Page 67, *G. pinnata* To numbers add—

"E 3601 Sukna Forest, Darjeeling Terai "

" 68, line 3 After "Burma" add "found by Mr R Thompson in Bustar and on the hills of Panabarás "

" 68, *Canarium bengalense*. To numbers add—

"E 3592. Sukna Forest, Darjeeling "

" 70 After line 12 add "Molesworth gives in 'Graphic Diagrams for the Strength of Teak Beams' Weight 50 lbs, P = 736, E = 2,900."

" 71. After line 19, to numbers add—

"E 3357 Kahmpung, Darjeeling, 4,000 ft

"E 3360 Rangirum, Darjeeling, 5,000 ft "

" 71, at the end of *MELIA* add "E 3499 is *Copadessa fruticosa*, Bl, from the Khurdha Forests, Orissa, where it is a common shrub or small tree of the dry stony hills and laterite plateaux, and used for fuel. It has a thin reddish brown bark and a red, moderately hard wood, which has a faint odour resembling that of the Toon wood. Pores very fine, numerous, usually in lines between the very numerous close and fine medullary rays. These latter are slightly wavy and short, and bend where they meet the pores. The pores are prominent as red lines on a vertical section. Annual rings marked by a white line. Growth of our specimen 5 to 6 rings per inch of radius. Weight, about 50 lbs per cubic foot "

" 72, *Dysoxylum procerum*. To numbers add—

"E 3595 Rungdung Forest, Darjeeling Terai "

" 72, line 4 Before "Assam" add "Sikkim and the Western Dúars, "

" 73, *Amoora Rohituka*. To vernacular names add "Sikru, Kól, "

" 73, at the end of "3 *A. spectabilis*" add—

"4 *A. decandra*, Hiern, Hook Fl Ind 1 562, Gamble  
16 Vern *Tangaruk*, Lepcha

pinkish white, hard. Pores  
concentric, bands of soft

"Eastern Himalaya, from 2,000 to 6 000 ft

"E 3392 Lebong, Darjeeling, 5,500 ft "

" 74, at the end of "WALSURA"

is *Heynea triyuga*,  
and yellowish white

subdivided, in groups or in short radial strings, surrounded with white tissue and arranged in wavy concentric lines. Medullary rays fine, short, numerous "

" 74, *Carapa moluccensis* To vernacular names add "Fussur, Beng, "

" 74, line 22 After "the hair" add "Capt Baker in May 1829 in 'Gleanings in Science' spoke of *Fussur* or *Pussooak* as being a jungle wood of a deep purple colour, extremely brittle and liable to warp. He said that native boats made of the best species last about 3 years, and that the wood, if of good quality, stands brackish water better than sál.

"The following were Captain Baker's experiments —

					Weight	P=
49, 52	Large tree	1825	.	$6 \times 1\frac{1}{2} \times 2'$	51 5	472
47, 48	Small "	1826		"	44	494
95, 101	Large "	1826	.	"	46	562
104	Small "	1826		"	47	586
334, 335	Large "	"		$33' \times 1\frac{1}{2} \times 1"$	..	502 "

" 75, line 31. After "wood 546" add "Molesworth gives for Honduras wood Weight 35 lbs, P = 615, E = 3,100."

Page 62, *Murraya exotica*. To numbers add "C 3495. Kolhán Forests, Singbhúm, Chota Nagpore."

„ 62, line 12. For "5" read "6"

„ 62, *Atalantia monophylla*. To vernacular names add "*Narguni*, Uriya;" and to numbers add "C 3515. Khurdha Forests, Orissa."

„ 62, *Feronia Elephantum*. To vernacular names add "*Vellam*, Madura;"

„ 63, *Ægle Marmelos*. To vernacular names add "*Maika*, Gondi; *Lohagasi*, Kól; *Auretpang*, Magh;"

„ 63. At the end of 8. *Ægle*. After "soft tissue." add—

"E 3295 is *Paramignya monophylla*, Wight, from Babookhola, Darjeeling, 4,000 ft. Bark white, corky, vertically cleft. Wood white, hard; close-grained. Pores very small to moderate-sized. Medullary rays very fine, extremely numerous. Prominent, sharp, white, concentric lines at unequal distances and often joining each other.

"E 3371 is the Orange, *Citrus Aurantium*, Linn. from Rajabhatkhawa, W. Dúars. Bark thin, greenish grey. Wood yellowish white, moderately hard, close and even-grained. Pores small, scanty, joined by concentric patches of white colour, which occasionally join, forming concentric circles. Medullary rays fine, very numerous, equidistant.

"E 3348 is the Lime, *Citrus medica*, L., from Darjeeling. Bark yellowish white, thin. Wood white, moderately hard. Pores small, numerous, often subdivided or in short radial lines. Medullary rays fine, very numerous. Concentric white lines distant. Pores often joined by white concentric patches.

"E 3284 is *Glycosmis pentaphylla*, Correa, from Chittagong. Bark light greyish-yellow. Wood white, hard, close-grained. Pores small, sometimes subdivided or arranged in radial lines. Medullary rays fine, wavy, very numerous. Sharp concentric white lines, often running into each other, very prominent.

"E 3355 is *Micromelum pubescens*, Bl., from the Teesta Valley, Darjeeling. Bark thin, white. Wood yellowish white, hard, close-grained. Pores small, scanty, often subdivided. Medullary rays fine, sharply marked. Sharp white concentric lines, often running into each other, prominent.

"E 3354 is *Clausena excavata*, Burm., from Sivoke, Darjeeling Terai. Bark thin, smooth, dark brown. Wood white. Pores small, scanty. Medullary rays very fine, very numerous. White concentric lines often interrupted, but very closely packed radially.

"C 3530 and C 3570 are *Limonia acidissima*, Linn. Vern. *Bhenta*, Uriya, from the Khurdha Forests, Orissa. It has a thin, light-brown bark, and very hard, yellowish-white wood. The pores are small, surrounded by white tissue, solitary or arranged in oblique strings. Medullary rays very fine, numerous, uniform and equidistant. Annual rings marked by a white line. Growth moderate, 8 rings per inch of radius. Weight, 59 lbs. per cubic foot."

„ 64, *Ailanthus malabarica*. To vernacular names add "*Mandadúpa*, Hassan;"

„ 64, *A. excelsa*. To vernacular names add "*Mahanim*, Uriya; *Ghorkaram*, Palamow;" and to numbers add "C 3449. Betlah Reserve, Palamow, Chota Nagpore."

„ 64, line 24. After "tree." add "Bark light greyish-brown, fibrous, rough."

„ 65, line 12 from the bottom. For "*Komari*" read "*Koniari*," and at line 5 from the bottom add—

"C 3541. Khurdha Forests, Orissa . . . 46 lbs."

„ 67, line 3. For "*Knkar*" read "*Kankar*"

„ 67, *Garuga pinnata*. To vernacular names add "*Nia jowa*, Kól; *Kékur*, Kharwar; *Karúr*, Bhumij; *Gharri*, Gondi;"

Page 67, *G pinnata* To numbers add—

"E 3604 Sukna Forest, Darjeeling Terai"

" 68, line 3 After "Burma" add "found by Mr R Thompson in Bustar and on the hills of Panabarus"

" 68, *Canarium bengalense*. To numbers add—

"E 3593 Sukna Forest, Darjeeling"

" 70 After line 12 add "Molesworth gives in 'Graphic Diagrams for the Strength of Teak Beams' Weight 50 lbs,  $P = 736$ ,  $E = 2,900$ "

" 71. After line 19, to numbers add—

"E 3307 Kalimpong Darjeeling, 4 000 ft

"E 3360 Rangirum, Darjeeling, 5,000 ft"

71, at the end of *MELIA* add "E 3499 is *Cipadessa fruticosa*, Bl, from the Khurdha Forests, Orissa, where it is a common shrub or small tree of the dry stony hills and laterite plateaux and used for fuel. It has a thin reddish brown bark and a red, moderately hard wood, which has a faint odour resembling that of the Toon wood. Pores very fine, numerous, usually in lines between the very numerous close and fine medullary rays. These latter are slightly wavy and short, and bend where they meet the pore lines on a vertical section. An Growth of our specimen 5 to about 50 lbs per cubic foot"

" 72 *Dysoxylum procerum* To numbers add—

"E 3095 Rungdung Forest, Darjeeling Terai"

" 72, line 4 Before "Assam" add "Sikkim and the Western Dúars,"

" 73 *Amoora Rohituka* To vernacular names add "Sikru, Kól,

" 73, at the end of "3 *A spectabilis* add—

"4 *A decandra* Hiern, Hook Fl Ind : 562, Gamble

16 Vern *Tangaruk*, Lepcha

A tree with th...

te, hard Pores bands of soft

"Eastern Himalaya, from 2 000 to 6 000 ft

"E 3392 Lebong, Darjeeling, 5 500 ft

" 74, at the end of "WALSURA" add "C 3170 ..."

is *Heynea trijuga*, Roxb

and yellowish white, mod

subdivided, in groups or in short radial strings, surrounded with white tissue and arranged in wavy concentric lines. Medullary rays fine, short, numerous

" 74 *Carapa moluccensis* To vernacular names add "Pussur, Beng."

" 74 line 22 After 'the hair' add "Capt Baker in May 1829 in 'Gleanings in Science' spoke of *Fussur* or *Pussocah* as being a jungle wood of a deep purple colour, extremely brittle and liable to warp. He said that native boats made of the best species last about 3 years, and that the wood, if of good quality, stands brackish water better than sal

"The following were Captain Baker's experiments—

					Weight	P=
49,	52	Large tree	1825	$6 \times 11\frac{1}{2} \times 2$	51.5	472
47	48	Small "	1826	"	44	484
95,	101	Large "	1826	"	46	562
	104	Small "	1826	"	47	586
331	335	Large "		$33' \times 1\frac{1}{2} \times 1"$		502

" 75, line 31 After "wood 546" add "Molesworth gives for Honduras wood Weight 35 lbs,  $P = 615$ ,  $E = 3,100$ "

Page 76, *Soyimida febrifuga*. To vernacular names add "*Suam*, Uriya ;"

„ 76. To numbers add—

“C 3566. Khurdha Forests, Orissa . . . 71 lbs.”

„ 77, *Chloroxylon Swietenia*. To vernacular names add “*Sengel sali*, Kól ; *Bharhul*, Kharwar ; *Bhira*, Gondi ; *Bhirwa*, Baigas ;”

„ 77. Below line 31 add “Molesworth in ‘Graphic Diagrams for the Strength of Teak Beams’ gives : Weight 60 lbs., P = 950, E = 5,200.”

„ 77, *C. Swietenia*. To numbers add— lbs.

“C 3443. Seemah Reserve, Palamow . . . ..  
C 3572. Khurdha Forests, Orissa . . . .. 57  
D 2926. Madras . . . . .”

„ 78, *Cedrela Toona*. To vernacular names add “*Kujya*, Tippera ; *Somso*, Bhutia ; *Katangai*, Kól ; *Madagiri vembu*, Madura ;”

„ 79, *C. Toona*. To numbers add— lbs.

“C 3476. Saranda Forests, Chota Nagpore . . . ..  
C 3545. Khurdha Forests, Orissa . . . . 31  
“E 3599. Sukna Forests, Darjeeling . . . . 39  
“E 3619, Latpanchor, Darjeeling Hills, 4,000 ft. . . .  
“E 3623, Kalingpung, Darjeeling, 2,000 ft. . . 35

(The last shows 11 rings on 7 inches radius or 1·6 rings per inch, while No. E 3619 has 31 rings on a radius of 7½, or about 4 per inch, and E 3599 shows 3½ rings per inch.) ”

„ 79. After the end of *C. serrata*, above the 6th line from the bottom of the page, add—

“In the Monograph of the Meliaceæ published in 1878 by Casimir de Candolle, the species of *Cedrela* formerly grouped under the one head of *Cedrela Toona*, Roxb., have been separately described. They are thus distinguished :—

“Ovary glabrous—

“Leaflets petioled . . . . *C. serrata*, Royle.  
“Leaflets sessile . . . . *C. glabra*, C. de Cand.

“Ovary hairy—

“Leaflets acute at the base . . *C. Toona*, Roxb.  
“Leaflets round at the base . . *C. microcarpa*, C. de Cand.

“In the ‘Trees, Shrubs and Climbers of the Darjeeling District,’ three varieties were spoken of and separated as follows :—

“No. 1. Deciduous ; flowering March ; fruiting June ; bark grey-brown, smooth, exfoliating ; found in the plains on low land.

“No. 2. Evergreen ; flowering October–November ; fruiting February and March ; bark dark brown, rough, not exfoliating ; found in the lower hills up to 4,000 ft.

“No. 3. Evergreen ; flowering June ; fruiting November–December ; bark light reddish-brown, exfoliating in long flakes ; found in the upper hills from 5,000 to 7,000 ft. and of great size.”

“No. 1 is *C. Toona*, Roxb. ; No. 2 probably *C. microcarpa*, C. de Cand. ; No. 3, probably *C. glabra*, C. de Cand. It would, however, have probably been better to describe No. 1 as ‘deciduous in the cold season’ and Nos. 2 and 3 as ‘deciduous in the rains.’ There is perhaps a fifth species.

“They may also be distinguished as follows by the capsule :—

Capsule smooth . { capsule round . . *C. Toona*.  
                                  „ long, pointed . *C. microcarpa*.  
Capsule covered with corky tubercles . *C. glabra*.

“Of the Northern Bengal specimens which we have examined, E 360 and E 2333 will be *C. glabra*, while E 655, E 2332, E 3599,

E 3619, and E 3623 will be *C microcarpa*. Some of the Assam, Chittagong and Burma specimens are probably *C microcarpa*.

"No B 3378 from the Salween, 2,000 feet, is probably *C. multijuga*, Kurz: 229 Vern *Toungdama* Barm, Nee, Karen (Trade name, like the other Toon-woods, *Thitkado*). It has a light, soft, pink wood, with the usual characteristic scent strongly perceptible, and structure resembling that of the other species of *Toon*, the pores being perhaps more scantily distributed. Weight, 35.5 lbs. per cubic foot."

At the foot of the page add—

"E 3341, from the north eastern part of Sibságar, Assam, called *Mipah*, is a soft, reddish wood, resembling that of *Melia*. It is evidently a useful wood for the same purposes as *Toon* is used, it splits well and is used for shingles. Pores moderate sized to large, often subdivided. Medullary rays moderately broad, short, tapering gradually at the ends. Annual rings distinct, about 7 per inch of radius. Weight, 27 lbs. per cubic foot."

Page 80, line 19 Omit "*Daphniphyllopsis*."

"81, *Olex scandens*. To vernacular names add "*Arthil*, Monghyr, *Rimmel*, Kol, *Bodobodora*, Uriya." To numbers add "*C* 3467 Bandraon, Singbhum, Chota Nagpore and *C* 3494. Kolhán Forests, Singbhum, Chota Nagpore."

"81, 2 *Daphniphyllopsis*, Kurz, &c, should be transferred to p 213 under CORNACEÆ *Nyssa sessiliflora*, Hook f, Hook Fl Ind ii 747."

"81, *Daphniphyllopsis capitata*. To numbers add—

"E 3608 Darjeeling, 6,000 ft"

"83, line 8. Add "*W* 3414 *Arthil*" and "*C* 3474 a small tree (E 3407) 14 rings with a girth of

"85 After "*E theaeifolius*" insert—

"6 *E frigidus*, Wall, Hook Fl Ind i 611, Gamble 18

A straggling shrub. Wood yellowish white, moderately hard, compact, with extremely small pores, extremely fine medullary rays and annual rings marked by the darker colour of the autumn wood."

"Himalaya, from Kumaun to Bhutan from 8,000 to 12,000 feet

"E 3406 Tonglo, Darjeeling, 10,000 feet"

"86, *Celastrus paniculata*. To vernacular names add "*Kyúri*, Kol,"

"86 After line 5 from the bottom add "*C* 3448, from the Barasand Reserve, Palamow, Chota Nagpore, is the same species as E 2334, but it differs in having no corky bark, but a brown thin bark. In the wood the difference is slight and consists merely in smaller pores, and a closer-grained wood. The difference may be only due to climate."

"87, *Celastrus spinosus*. To numbers add "*H* 2950, Sutlej Valley, Punjab, 3,500 ft."

"87. After "*C senegalensis*" insert—

"4 *C acuminatus*, Wall, Kurz i. 252 *Gymnosporia acuminata*, Hook f, Hook Fl Ind i 619 *G. Thomsoni*, Kurz, Gamble 19, Vern *Phugong*, Lepcha

ite Wood white, bands, in struc-

"Sikkim Himalaya, and Khasia Hills, up to 5,000 feet

"E 3391. Lebong, Darjeeling, 5,500 feet

- Page 113, *Spondias mangifera*. To vernacular names add "Adai, Gáro ;"
- „ 113, last line but three. After "about Simla." add "The silkworm *Actias Silene* is fed upon its leaves."
- „ 114, *Moringa pterygosperma*. To vernacular names add "Mulgia, Kól ;"
- „ 117, line 1. For "Wood white." read "Wood white, with an irregular grey heartwood."
- „ 117, line 2. For "edge" read "edges"
- „ 117, line 7. After "in Europe." add "Our Darjeeling specimen shews 12 rings per inch of radius."
- „ 117. After line 8 add—  
"E 3405. Sandukpho, Darjeeling, 11,000 ft."
- „ 117, line 10. After "and Burma." add "It has a smooth yellowish bark, white wood and pores rather scanty, solitary or in radial lines between the fine medullary rays. (E 3311. Pankabari, Darjeeling, 3,000 ft.)"
117. at foot of page, add—  
"3. *Indigofera stachyodes*, Ldl.; Gamble 25. *I. Dosua*, Ham., var. *tomentosa*, Baker; Hook. Fl. Ind. ii, 102. Vern. *Chiringi jhar*, Nep.  
"A small tree with thin brown bark. Wood hard, white, with an irregular dark-coloured heartwood. Pores small to moderate-sized, enclosed in patches of white tissue, forming irregular, sometimes concentric, bands. Medullary rays fine, numerous, equidistant.  
"Inner Eastern Himalaya, Khasia Hills, Sylhet.  
"E 3359. Rhenokh, Sikkim, 3,000 ft.  
"C 3447 from Barasand Reserve, Palamow, Chota Nagpore, is *I. pulchella*, Roxb. Vern. *Uterr*, Kól; *Jirhiul*, Kharwar. The wood has a structure similar to that of *I. heterantha*."
- „ 118, line 17. After "Kumaun;" insert "Hól, Kól; Gurar, Kharwar;"
- „ 118, line 18. For "No. 3479" read "No. E 479."
- „ 118, line 19 from the bottom. After "Kumaun;" add "Balashoe, Mechi;"
- „ 118, line 8 from the bottom. After "fish." add "E 3636 from Bamunpokri, Darjeeling Terai, is this species. It has a thin brown bark and white wood with an irregular dark heartwood. Pores moderate-sized, often subdivided, enclosed in, and often joined by, round concentric rings of white tissue. Medullary rays short, fine to very fine, numerous."
- „ 119, *Ougeinia dalbergioides*. To vernacular names add "Tinsai, Gondi; Ruta, Kól;" and (p. 120) to numbers add "C 3477. Saranda Forests, Chota Nagpore."
- „ 121. After line 8 add "C 3432 is *Desmodium pulchellum*, Roxb., from Amjheria, Lohardugga, Chota Nagpore, with a yellowish-white, hard wood, annual rings marked by a white line, small pores, and fine white medullary rays;"
- 121, line 10. At the end add "Karzani, Monghyr; Kaincho, Uriya ;"
- 121, *Erythrina suberosa*. To vernacular names add "Farhud, Kharwar ;"
- „ 122, *E. indica*. To vernacular names add "Paldua, Uriya; Pharad, Monghyr ;"
- „ 122, line 12 from the bottom. For "F 3106" read "E 3106;" and to numbers add "E 3330. Darjeeling, 7,000 ft."
- „ 122, line 5 from the bottom, after "Nep.;" insert "Moru, murrá, Kól; Bandu, durang, Kharwar ;"
- „ 123, line 3. After "Gondi;" add "Badúri, Singrampur; Ohikunt, Monghyr ;"

- Page 123, *Butea frondosa* To vernacular names add "*Palashu*, Mechi, *Murut*, Kol, *Pharsa*, Baigas, *Paras*, *farás*, Behar,"
- „ 123, line 26 from bottom After "slow matches." add "C 979 is a fine specimen of the fibre sent from Berar
- „ 123, last line but three After "*Lepcha*," add "*Dangshukop*, Mechi"
- „ 123, last line Add "*F. Chappar*, Ham and *F. strobilifera*, R Br, are common shrubs of forest undergrowth Vern *Ulu*, Kól"
- „ 124, line 40 For '4 *Dalbergia Sissoo*,' read "4 *D. Sissoo*,"
- „ 126 After the schedule add "Molesworth gives Weight, 52 lbs, P = 760, E = 3,800," and to numbers "E 3588 Darjeeling Terai"
- 127, *Dalbergia latifolia* To vernacular names add "*Rute*, Kol, *Ruzerap* Mechi, and to numbers add—
- |         |                          |     |
|---------|--------------------------|-----|
|         |                          | lbs |
| "C 3456 | Saidope Reserve, Palamow | —   |
| "C 3522 | Khurdha Forests, Orissa  | 61  |
| 'D 1476 | Anamalai Hills, Madras   | '   |
- „ 128, line 4 For "W 720 read "W 729"
- „ 128 *D lanceolaria* To vernacular names add "*Piri*, Kól,"
- „ 129, *D paniculata* To vernacular names add "*Surteli*, *passi*, Baigas,"
- „ 130 At the end of *DALBERGIA* add "C 3450 is *Dalbergia volubilis*, Roxb, from Ramundag Reserve, Palamow Bark thin, brown, peeling off in flakes Wood light brown hard Pores small to very large, scanty Medullary rays very fine, very numerous Occasional faint concentric bands
- „ 130 In Schedule, last line For—
- |                |      |   |      |     |
|----------------|------|---|------|-----|
| "Bennett, No 1 | 1872 | „ | 49 5 | 827 |
|----------------|------|---|------|-----|
- read—
- |               |      |      |             |     |
|---------------|------|------|-------------|-----|
| "Bennett No 1 | 1872 | 49 5 | 3 × 1½ × 1½ | 830 |
|---------------|------|------|-------------|-----|
- „ 131, line 12 For 'B 584 read 'B 548'
- „ 132, *Pterocarpus Marsupium* To vernacular names add "*Hitun*, *hid*, Kól, *Beeya*, *persar*, Kharwar, *Byo*, Gondí, *Piasul*, Urya,
- „ 133, *P Marsupium* To numbers add—
- |         |                         |         |
|---------|-------------------------|---------|
| "C 3542 | Khurdha Forests, Orissa | 54 lbs" |
|---------|-------------------------|---------|
- „ 133, *Pongamia glabra* To vernacular names add "*Khawari*, *karmuy*, Sirguja,
- „ 133 line 10 from the bottom After "Beng, add "*Nas bel*, C P, and for "*golari* read "*Golari*"
- „ 134 After line 8 add 'No E 3356, from the Sivole Hills, Darjeeling, 1500 ft, is probably *Ormosia glauca*, Wall, Hook Fl Ind ii 253 Vern *Chuklen*, *Lepcha*, a large tree of the Central Himalaya. It has a grey bark, and greyish white moderately hard wood The pores are large, scanty, sometimes subdivided, they are joined by irregular, wavy, somewhat anastomosing patches of white, soft tissue The medullary rays are fine to moderately broad, wavy The tree bears a woody pod, filled with bright scarlet seeds, which are used by the Lepchas as a bait to catch jungle fowl
- „ 135 At the end of *CESALPINIA* add 'C 3460, from Saranda, Chota Nagpore, is *Cesalpinia sepiaria*, Roxb Vern *Uchay*, Kól, *Gilo*, Urya It has a yellowish white corky bark, with large corky excrescences, bearing strong thorns The wood is light brown, moderately hard, with masses of reddish brown harder wood near the centre. The pores are large, often subdivided or in groups, surrounded and connected by anastomosing bands of white tissue The medullary rays are fine, very numerous, the distance between them much less than the transverse diameter of the pores'



- Page 136, line 13, for "Manson" read "Mr. Manson" and line 15, after "end." add  
 "A large tree measured by the Inspector General at Dalingkote was found to have a girth of 121 inches, a height of 181 feet and 110 feet to the first branch."
- „ 136, *Cassia Fistula*. To vernacular names add "Hari, Kól; Dunrás, Kharwar; Jagarúa, Gondi; Raella, Baigas." and omit "persar, Palamow.", and (p. 137) to numbers add—  
 "C 3544. Khurdha Forests, Orissa . . . 58 lbs."
- „ 139, line 8. For "Paur, bela, Gondi;" read "Paur-bela, Gondi;" and then add "Lamma, ríng, Kól; Maulan, Kharwar;"
- „ 139, line 17. After "Terai." add "C 977 is a fine specimen of the fibre sent from Berar. It was examined in 1879 by Mr. Routledge, who reported it to be an excellent, strong fibre, hemp character, and tough, (*Kew Gardens Report, 1879.*)"
- „ 139, *Bauhinia malabarica*. To vernacular names add "Laba, Kól;"
- „ 139, *B. racemosa*. To vernacular names add "Kaimu, Kól; Ghatonli, Oraon; Katmauli, Kharwar;"
- „ 140, *B. purpurea*. To vernacular names add "Buruju, Kól;"
- „ 140, *B. variegata*. To vernacular names add "Kurmang, Mechi; Singya, Kól; Kundol, Bhumij;" and at the end of the list of numbers (p. 141) insert "H 105 from Bhajji, Punjab, 3,000 ft., is also probably this species."
- „ 141, *B. retusa*. To vernacular names add "Laba, Kól; Tewar, Oraon; Katman, Kharwar; Thaur, Gondi."
- „ 142, *Tamarindus indica*. To vernacular names add "Jojo, Kól; Chita, Gondi;"
- „ 143, line 15 from the bottom. After "line." add "At the Dehri workshops on the Sone River, it has been used instead of brass for bearings for machinery, and found to wear well. In the Sone river piles of *anján* have been found after twenty years as sound as when first put in."
- „ 146, lines 12, 11, and 9 from the bottom. Omit the words "two of the species now being grown, viz.," and "P. pallida of"
- „ 146. Omit the last two lines.
- „ 147. Omit lines 1, 2, 17 to 21.
- „ 147, *Prosopis spicigera*. To vernacular names add "Somí, Monghyr; Perambai, Madura;"
- „ 148, line 6. After "small tree." add "Bark brown, fibrous, deeply fissured vertically."
- „ 148, *Mimosa rubicaulis*. To vernacular names add "Dandu deta, Kól; Arai, Kharwar;"
- „ 148, *Xylia dolabriformis*. To vernacular names add "Kongora, Uriya;" and (p. 149) to numbers add—  
 "C 3514, 3546. Khurdha Forests, Orissa . . . 54 lbs."
- „ 149, line 3. After "District," add "Orissa,"
- „ 149, after the schedule add "Molesworth gives: Weight 58 lbs., P = 836, E = 4,300."
- „ 151, line 34. After the words "Skinner gives 884." add "Molesworth gives Weight 54 lbs., P = 880, and E = 4,150."
- „ 152, *Acacia leucophlœa*. To vernacular names add "Reúnja, rinja, Gondi; Goira, Uriya;" and to numbers add "C 3506. Khurdha Forests, Orissa."
- „ 154. Above line 19 from the bottom insert—  
 "C 3526. Khurdha Forests, Orissa . . . 62 lbs."

- Page 154, line 19 from the bottom. For "E 663 read 'E 665"
- " 154, " 7 " " " For "locolly' read "locally"
- " 154, " 6 " " " For "F 2355 read 'E 2355"
- " 154 Below line 4 from the bottom add "No 3120 is a piece of hard, dark red wood, resembling this last form in appearance and structure. It was obtained from the excavations made at Prince's Dock, Bombay (see Indian Forester, Vol VI, p 108 )
- " 155 *A. Intsia* To vernacular names add "Kundaru, Kól,"
- " 155, line 15 For "E 2379' read 'E 2359'
- " 155 After line 15 add "C 3468, from Bandgaon, Singbhúm, Chota Nagpore, is this species, but the wood is harder and, though recognizable, the angular form of the stem is not so prominent as in the Darjeeling specimens"
- " 155 *A. pennata* To vernacular names add "Kundaru, Kól, Arar, Kharwar,"
- " 156, *Albizia Lebbeck* To vernacular names add "Tinia, Uriya and (p 157) to numbers add—
- "C 3560, C 3567 Khurdha Forests, Orissa 49, 59 lbs"
- " 158, *A. procera* To vernacular names add "Tinia, Uriya, Pandras, Kol, Garso, Kharwar, Laokri, Mechí,"
- " 159, line 2 For "between *A. Lebbeck* and the woods of *A. procera*" read 'between the woods of *A. Lebbeck* and *A. procera*'
- " 159, line 10 For "P = 884 read "P = 695"
- " 160, *A. stipulata* To vernacular names add "Chapín, Kera scrum, Kól, Bunsobri, Mechí,
- " 160, *A. amara* To vernacular names add "Wusel, Madura,"
- " 164 line 12 Add "Vern Lali, Nep"
- " 164, line 13 After "reddish brown add "with a pretty wavy lustro on a radial section
- " 164, after line 17, add "E 3422 Rangirum, Darjeeling, 6,500 ft"
- " 165, line 10 from the bottom After "Himalaya" add "It has a brown thick, soft bark and porous wood with large pores and broad medullary rays (E 3361, Darjeeling, 6 500 ft)
- " 166, *Rubus lineatus* To list of numbers add "E 3383. Senchul, Darjeeling, 8,000 feet.
- " 166, line 17 from the bottom After "Roxb Ti Ind n 513, add "Vern. Kua, Beng
- " 168. After line 6 add "E 3335 Rangirum, Darjeeling, 6 000 feet."
- " 168, at the end of ERIOBOTRYA After line 6 add "E 3411, from Darjeeling, is *Docynia indica*, Dene The wood closely resembles that of *Pyrus* Bark  $\frac{1}{2}$  inch thick, greyish brown shining, splitting off in irregular flakes and leaving a rough under surface Wood light brown with an irregular purple brown heartwood, hard, close, and even grained Pores very small, more numerous in the spring wood Medullary rays fine, very numerous Annual rings marked by a line Our specimen is a round with a mean diameter of 12 inches, and shewing 36 well-marked rings, the growth, therefore, is 6 rings per inch of radius"
- " 169, last line but two Add "E 3401 Tonglo, Darjeeling, 10,000 feet (has well marked medullary patches)"
- " 170 After line 7 at the end of PYRUS add—
- "E 3403, from Tonglo, Darjeeling, 9,000 feet, is *P. rhamnodes*, Dene, Hook Fl. Ind n 377 Vern Kumbul, Lepcha, Kangedoc, Bhutia, a small, often epiphytic tree of the upper forests of the Sikkim Himalaya. It has a hard, yellowish-

brown wood, with numerous small, evenly distributed pores and very numerous fine medullary rays. The annual rings are marked by a darker line.

"E 3633, from Goompahar, Darjeeling, 7,000 ft., is *P. Wallichii*, Hook. f. It has a greyish-brown bark; and brown, moderately hard wood. Pores numerous, small to moderate-sized, fewer in the autumn wood and thus marking the annual rings. Medullary rays very fine, very numerous, indistinct. Medullary patches few."

"E 3100, from Darjeeling, 7,000 feet, is *Photinia integrifolia*, Ldl.; Hook. Fl. Ind. ii. 381; Gamble 37. Vern. *Shumbul*, Lepcha, a small tree of the Eastern Himalaya. Bark thin, greyish brown. Wood brown, moderately hard, close-grained. Pores small, uniformly distributed. Medullary rays fine, very numerous, the distance between them about equal to the transverse diameter of the pores. Annual rings marked by a sharp line."

Page 173, line 15 from the bottom. For "H 303S." read "H 302S."

„ 174, line 8. Omit "H 2912."

„ 177, *Carallia integerrima*. To vernacular names add "Jár, Kól;" and to numbers add "C 3182. Saranda Forests, Chota Nagpore."

„ 179, line 6. After "Lepcha;" add "Palandu, koldungi. Kól; Kundol, Bhumij; Buria, raterr, Kharwar; Atundi, Uriya;"

„ 179, *Terminalia belerica*. To vernacular names add "Lapúng, lihúng, Kól;"

„ 180, *T. Chebula*. To vernacular names add "Rola, Kól; Hadra, Oraon;" and (p. 181) to numbers add—

"C 3531. Khurdha Forests, Orissa . . . 59 lbs."

„ 182, *T. tomentosa*. To vernacular names add 'Hatana, Kól;' and to numbers "E 3590. Darjeeling Terai."

„ 184, *T. Arjuna*. To vernacular names add "Gara hatana, Kól;" and (p. 185) to numbers add—

"C 3161. Saranda Forests, Chota Nagpore . . . 69 lbs."

„ 185, *Anogeissus latifolia*. To vernacular names add "Hescl, Kól;" and (p. 186) to numbers add—

"C 3562. Khurdha Forests, Orissa . . . 62 lbs."

„ 186, *A. acuminata*. To vernacular names add "Gara hescl, pandri, pansí Kól;" and (p. 187) to numbers add "C 3162. Saranda Forests, Chota Nagpore."

„ 187, line 23. After "A deciduous tree." add "Bark thin, greyish white, smooth."

„ 187, *Gyrocarpus Jacquini*. To numbers add "C 3517. Sonakalla, Khurdha, Orissa."

„ 190, line 26. For "1095-7" read "1095-8" and for "2, 3, 4" read "2, 3, 4, 5."

„ 190, *Psidium Guava*. To vernacular names add "Gaya, Magh;"

„ 193, *Eugenia formosa*. To vernacular names add "Panchidung, Gáro;"

„ 194, *E. operculata*. To vernacular names add "Topa, Kól;"

„ 194, *E. Jambolana*. To vernacular names add "Kuda, Kól; Jambún, Oraon;" and to numbers 'E 3598, Darjeeling Terai.'

„ 195, *E. Heyneana*. To vernacular names add "Gara kuda, Kól; Jamti, Kharwar;"

„ 195. At the bottom of the page, add "E 3439, from the Ramundag Reserve, Palamow, Chota Nagpore, is this species. The white concentric bands are more prominent and enclose the pores."

„ 196, after line 5, add "No. C 3582, from the Khurdha Forests, Orissa, is probably *E. zeylanica*, Wight. Vern. *Sagarabatna*, Uriya. It is a small myrtle-like shrub of the scrub forests. Bark brown. Wood hard,

close grained, grey Pores small and extremely small, joined by concentric bands of white tissue, which are closely packed Medullary rays very fine, very numerous

Page 196, *Barringtonia acutangula* To vernacular names add "Iyar, Monghyr, Saprun, Kól, Hinyara, Uriya" To numbers add "C 3470, Saranda Forests, Chota Nagpore."

„ 197. *Careya arborea* To vernacular names add "Asunda, Kól, Kum, Bhumj,"

„ 197, in schedule, line 8 from the bottom, column 5, omit the word "Various

„ 197, in schedule, line 4 from the bottom, column 5, for "2 X X 1" read "2 X 1 X 1"

„ 198, line 9 After "astringent" add "C 980 is a fine specimen of the fibre sent from Berar"

„ 199 At the end of MELASTOMA add—

"E 3419, from Lebong, Darjeeling, 5,000 feet, is *Oryzopsis paniculata*, DC Bark reddish brown, thin. Wood light reddish-grey, moderately hard, with dark brown medullary patches Pores small to moderate sized, scanty, often in short radial lines Medullary rays fine, short, numerous, not straight Concentric bands of soft tissue, often interrupted, prominent.

"C 3561, from the Khurdha Forests, Orissa, is *Memecylon edule*,  
l, consisting  
and lighter  
layers may  
larger fine

and short, the smaller extremely fine Weight, 60 lbs per cubic foot"

„ 199, line 13 from the bottom For "Atlacus" read "Attacus,"

„ 200, *Woodfordia floribunda* To vernacular names add "Icha, Kól, Dadhi, Bhumj, Harwar, Uriya"

„ 200, *Lagerstromia parviflora* To vernacular names add "Saike, Kól, Sidha Behar," and (p 201) to numbers add—

"C 3547. Khurdha Forests, Orissa . . . 58 lbs"

„ 202 *L. Reginae* To vernacular names add "Gara saike, Kól,"

„ 202, line 10 from the bottom After "Ratnagiri" add "Saranda forests in Chota Nagpore"

„ 203, *L. Reginae* Last of Numbers For "E 620" read "E 630" and after "E 2188 Nowgong Assam" add "E 1433 Assam"

„ 204, *Duabanga sonneratioides* To vernacular names add "Achúng, Gáro," and to numbers "E 3622 Kalimpong, Darjeeling, 2,000 ft"

„ 204, line 20 from bottom After "radius" add "Our specimen No E 3622 shews only 2 rings per inch."

„ 205 *Sonneratia acida*. To numbers add—

' B 3379, from Kyoulphyoo, Arracan . . . 43 lbs '

„ 206, *Casuarina tomentosa*. To vernacular names add "Rore, Kól, Beri, Kharwar," and to numbers add—

"C 3527 Khurdha Forests, Orissa . . . 43 lbs"

„ 206, line 23 For "O 1393" read "O 1363"

„ 206, *C. graveolens* To vernacular names add "Reri, Kól, Beri, Kharwar,"

„ 208, line 7 For "Bark grey-brown, wrinkled" read "Bark greyish white, one inch thick, spongy, marked with horizontal wrinkles and small vertical lines of lenticels. peels off in thin papery layers."

„ 209 line 2. After "Cachar," add "Arengi banu, Kól,"

Page 209, line 6. After "H. f and Th.;" add "Hook. Fl. Ind. ii. 740."

„ 209, line 7. For "eastern slopes of the Arracan Yoma," read "Khasia Hills and the Eastern, &c."

„ 209, at the end of *HEPTAPLEURUM* add "C 3442, from Neturhát, Palamow, 3,000 feet, is *Heptapleurum venulosum*, Seem. Vern. *Sukriruin*, Kól. Bark grey, shining. Wood light brown, soft. Pores small. Medullary rays fine to moderately broad."

"E 3635 from Goompahar Forest, Darjeeling, 7,500 ft., is *H. impressum*, C. B. Clarke. Bark brown, thick, exuding a copious gum. Wood grey, soft. Pores very small, evenly distributed. Medullary rays prominent, moderately broad. Conspicuous concentric white lines which run into each other. Annual rings doubtful.

„ 210. At the end of *BRASSAIOPSIS* add "E 3409, from Darjeeling, 6,700 feet, is *Brassaiopsis speciosa*, Dene. and Plch.; Hook. Fl. Ind. ii. 737 (*B. floribunda*, Seem.; Gamble 44), a moderate-sized tree, with thin grey bark, and soft white wood, in structure resembling that of *B. mitis*. Growth fast, 5 rings per inch of radius."

„ 210, line 10. After "Miq.;" add "Hook. Fl. Ind. ii. 738."

„ 210, line 11. For "Martaban Hills above 5,000 feet" add "Eastern Himalaya, Khasia and Martaban, &c."

„ 210, line 12. After "Seem.;" add "Hook. Fl. Ind. ii. 738."

„ 210, line 24. After "Linn.;" add "Hook. Fl. Ind. ii. 739."

„ 210, at the end of *HEDERA* add—

"E 3402, from Tonglo, Darjeeling, 9,000 feet, is *Gamblea ciliata*, C. B. Clarke; Hook. Fl. Ind. ii. 740. Vern. *Rama*, Bhutia, a large tree of the forests of the Senchul and Singalila Ranges above 8,000 feet. Bark grey, smooth. Wood white, shining, moderately hard. Pores extremely small, except on the outer edges of the annual rings, which are very distinctly marked by lines of moderate-sized pores. Medullary rays fine and moderately broad, white, shining, irregularly distributed.

"E 3576, from Darjeeling, 6,000 feet, is *Pentapanax racemosum*, Seem. A large climbing or straggling shrub. Bark silvery grey, thin, peeling off in thin flakes. Wood greyish white, soft. Annual rings very prominently marked by a line of large pores: the pores in the rest of the wood small, scanty. Medullary rays moderately broad."

„ 211, line 2. After "*Torricellia tiliaefolia*, DC.;" add "Hook. Fl. Ind. ii. 748;"

„ 211, line 4. After "Khasia Hills." add "(See p. 81, *Daphniphyllopsis capitata*)."

„ 211, line 11. After "Thwaites;" add "Hook. Fl. Ind. ii. 741;"

„ 211. *Alangium Lamarchii*. To vernacular names add "*Ankol*, Kól; *Ankula*, *dolanku*, Uriya;" and to numbers add—

	lbs.
"C 3466. Saranda Forests, Chota Nagpore . . .	...
"C 3564. Khurdha Forests, Orissa . . .	42"

„ 211, line 33. After "Roxb. Fl. Ind. ii. 261;" add "Hook. Fl. Ind. ii. 743;"

„ 212, line 5. After "Linn.;" add "Hook. Fl. Ind. ii. 744;"

„ 212, line 9. After "Wall.;" add "Hook. Fl. Ind. ii. 744;"

„ 212, line 24. After "Wall.;" add "Hook. Fl. Ind. ii. 744;"

„ 212, line 36. After "Wall.;" add "Hook. Fl. Ind. ii. 745;"

„ 213, line 11. After "Hook. f. and Th.;" add "Hook. Fl. Ind. ii. 747;"

- Page 215, *Fibui num erubescens* To vernacular names add 'Asari Nep, Naloul, Bhutia, '
- „ 217, last line but 8 For "E 2866" read "E 2856"
- „ 219, *Anthocephalus Caaamba* To vernacular names add "Sunko, Kól, '
- „ 220 *Adina cordifolia* To vernacular names add "Ki rumba, Komba, Kol, "
- „ 220, last line but 2 For "Huanbeng" read "Hnauheng"
- „ 221, *A cordifolia* To numbers, add—  
"C 3543 Khurdha Forests, Orissa . 43 lbs '
- „ 222 in page number For '22d' read '222"
- „ 222 *Stephegyne parvifolia*. To vernacular names add "Gur komba, Kól, Gur, gur, guram, Kharwar, ' and to list of numbers add—  
"C 824 Bairagarh Reserve, Berar."
- „ 224 *Hymenodictyon excelsum* To vernacular names add "Salt, Kól, Burkunda, Bhumij, Konso, Uriya, '
- „ 225 After line 7, add—  
"C 3565 Khurdha Forests, Orissa . 29 lbs '
- „ 226, *Webera asiatica* To numbers add "C 3579, C 3520 Khurdha Forests, Orissa Vern *Jhauphauka*
- „ 226 *Randia uliginosa* To vernacular names add *Kumkum*, Kól, '
- „ 227, *R dumetorum* To vernacular names add "Portoko, Kol, Mohna, Kharwar, "
- „ 227. At the bottom of the page add "E 3363 from Dhupguri, W Dúais, is *R rigida*, DC The wood resembles in structure that of *R uliginosa*
- „ 228, *Gardenia turgida* To vernacular names add 'Duduri Kol, Kharhar, Oraon, and to numbers add "C 3435 Kumandi Reserve, Palamow
- „ 228 After G. LUCIDA, at the bottom of the page, add "C 3465, from Bandgaon, Singbhum, Chota Nagpore, is *G gummifera*, Linn Vern *Bururi, burui* Kol, *Bruru*, Bhumij Bark brown, nearly  $\frac{1}{2}$  inch thick Wood yellowish white, hard, close grained Annual rings indistinct Pores very small Medullary rays very fine, very numerous This wood might serve as a substitute for boxwood '
- „ 229 *G latifolia* To vernacular names add 'Papra, papadar, Kol, Popra, Kharwar, '
- „ 229, lines 17, 18 For "B" read "C"
- „ 229 At the end of GARDENIA add "E 3286, from the Rinkheong Reserve, Chittagong, is *Hyptianthera stricta*, W and A Bark brown, somewhat corky, thin, cleft in long continuous furrows about 2 lines apart Wood brown, moderately hard close grained Pores small, evenly distributed Medullary rays of two classes small ones very fine, very numerous, larger ones few, fine. Our specimen weighs 56 lbs per cubic foot '
- „ 230, *Plectonina didyma* To vernacular names add "Jor, Kól, '
- „ 230, line 11 For "grey" read "light brown, "
- „ 230, *P didyma* To numbers add "C 3481 Saranda Forests, Chota Nagpore "
- „ 230, *Ixora parviflora* To vernacular names add "Pete, Kól, ' and to numbers add—  
"C 3464 Saranda Forests, Chota Nagpore '
- „ 231, *Pavetta tomentosa* To vernacular names add "Sikrida, sikerup, Kól, Burhi, Kharwar, '
- „ 231, line 22 After "Gamble 49 insert "The Coffee plant "

Page 232, *Morinda exserta*. To numbers add—

“C 3535. Khurdha Forests, Orissa . . . 40 lbs.”

„ 232. At the end of MORINDA add “C 3431 from Amjheria, Lohardugga, is *Hamiltonia suaveolens*, Roxb. Vern. *Kudia*, Kharwar. It has a grey, shining bark, which peels off in short papery flakes. The wood is dark grey, soft, porous, with few small pores often subdivided, and moderately broad to broad medullary rays.”

„ 233, line 13. For “Weight, 31.5 lbs.” read “Weight, our specimen gives 27 lbs.”

„ 233, last line but one. For “*Thibandia*” read “*Thibaudia*”

„ 235, line 25. For “E 3328” read “E 3325”

„ 237, line 9. After “*Kégu*,” add “*kalma*,”

„ 238. At the end of RHODODENDRON add “No. E 3394, *Gaultheria Griffithiana*, Wight, from Jalapahar, Darjeeling, 7,500 feet, has a moderately hard, greyish-white wood, with numerous brown medullary spots. Pores extremely small and numerous. Medullary rays fine, scanty. The bark is light brown, peeling off in papery layers.”

„ 240. After line 25, add “C 3438 from Ramundag Reserve, Palamow, and C 3528 from the Khurdha Forests, Orissa, are this species, but the bark is thinner, and the wood differs by having the medullary rays only ‘broad’ instead of ‘extremely broad.’”

„ 241. At the end of ARDISIA add “E 3350, from the Sivoke Hills, Darjeeling, 1,500 feet, is *A. involuerata*, Kurz; Gamble 53. Vern. *Denyok*, Lepcha. It has a yellow corky bark and pinkish-white wood; with small, scanty pores, and broad, white, wavy medullary rays.

“E 3367, from the Kasalong Reserve, Chittagong, is *A. paniculata*, Roxb. Fl. Ind. i. 580; Beddome cxxxviii.; Kurz ii. 107, a small tree of Chittagong with handsome pink flowers. The bark is thin, greyish brown; and the wood pinkish white, with small pores radially disposed between the short, broad, wavy medullary rays.

“C 3463, from Bandgaon Ghât, Singbhûm, Chota Nagpore, 2,000 feet, is a species of *Ardisia*, probably *A. solanacea*, Willd. Bark brown, smooth. Wood grey, moderately hard. Pores small and very small, often in short radial lines between the broad, wavy, porous medullary rays.”

„ 242. At the end of SARCOSPERMA add “C 3504, from the Khurdha Forests, Orissa, is *Sideroxylon tomentosum*, Roxb. Vern. *Kanta bohul*, Uriya. Bark light reddish-brown, thin. Wood light reddish-white, hard. Pores fine to moderate-sized, in short concentric or sometimes oblique lines. Medullary rays very fine, very numerous, equidistant. Concentric bands of rather darker colour having the appearance of annual rings.”

„ 243, *Bassia latifolia*. To vernacular names add “*Mandukum*, Kól; *Mohâl*, Bhumij;”

„ 246, *Mimusops indica*. To numbers add—

“C 3551. Khurdha Forests, Orissa . . . 72 lbs.”

„ 249. *Diospyros Melanoxylon*. To vernacular names add “*Tiril*, Kól;”

„ 249, *D. Melanoxylon*. To numbers add “C 3493. Kolhân Forests, Singbhûm, Chota Nagpore.”

„ 250, last line but 5. For “No. 62” read “No. 61”

„ 251, *D. Ebenum*. To numbers add “W 1207. South Kanara (saplings).”

„ 252, line 18. For “white” read “grey”

Page 252, *D Embryopteris* To numbers add "C 3474 Saranda Forests, Chota Nagpore

" 253 After line 9, at the end of *EBENACEÆ*, add "C 3502, from the Khurdh Forests, Orissa, is *Maba burifolia*, Pers Vern *Guakoli*, Uriya Bark greyish black, thin Wood greyish white, moderately hard, Pores small, scanty, in short radial lines Medullary rays very fine, numerous and equidistant Concentric lines of white tissue, thin, very numerous and regular. In Orissa it is a very common bush on poor soils"

" 253 After line 24 add "E 3372, Darjeeling, 6,000 feet, has a similar structure, but the white bands are much less marked It is probably *S serrulatum*"

" 254, at the end of *SYMPLOCOS* add—

"E 3347, Darjeeling, 6,000 feet is *Symplocos glomerata*, King It has a thin brown bark and white wood resembling in structure that of *S lucida*."

"C 3491, from the Kolbān Forests, Singbhūm, Chota Nagpore, is *S racemosa*, Roxb Vern *Ludum*, Kōl, Lodh, Oraon Bark yellow, rough, spongy,  $\frac{3}{4}$  inch thick Wood white, soft Pores small, often in radial lines Medullary rays short, broad, numerous"

" 254, last line After "Beng," add "Samuḥar, Kharwar, *Saparūng*, Kōl,"

" 255, *Schrebera swietenoides* To vernacular names add "*Jarjo*, *sandapsing*, Kōl, *Ghato*, Oraon, *Ghanto*, Kharwar,"

" 256, *S swietenoides* To numbers add "C 3454 Ramundag Reserve, Palamow, Chota Nagpore."

" 256, line 35 After "*Shang*, Afg," add "*Banafsh*, Kandahar,"

" 256, line 40 After "good fuel" add "Experiments, made at Kandahar by Captain Call, R E, with pieces 1' X 1' X 1', gave for the average weight 32 2 lbs and 641 for the value of P (Indian Forester, Vol V, p 480)"

" 259, after line 17, add—

"C . . . . .  
probably . . . . .  
i 108) . . . . .  
brown . . . . .  
sized, oft . . . . .  
equidistant, the distance between them equal to, or less than, the diameter of the pores Fine concentric lines of white tissue, which may be annual rings"

" 259, at the end of *LINOCIFEA* add—

"C 3412 from Hazaribagh, and C 3492 from Kolbān, Singbhūm, Chota Nagpore, are *Nyctanthes Arbor-tristis*, Linn Bark  $\frac{1}{4}$  inch thick, light brown, rough Wood yellowish-brown, moderately hard, close-grained Pores small, grouped in short radial lines, but arranged more or less in concentric rings, the annual rings apparently marked by a dark line and a more complete ring of pores Medullary rays very fine to fine, very numerous, the distance between them equal to the transverse diameter of the pores"

" 261, *Carissa diffusa*. To vernacular names add "*Kanuwan*, Oraon, *Anka kols*, Uriya," and to numbers add "C 3518. Khurdha Forests, Orissa"

" 261, at the



- Page 262, *Alstonia scholaris*. To vernacular names add " *Chatin*, *lomudu*, Kól; *Chhatiana*, Uriya; "
- „ 263, *Tabernamontana coronaria*. To vernacular names add " *Chameli*, *Monghyr*; "
- „ 263, *Holarrhena antidysenterica*. To vernacular names add " *Korkoria*, *Oraon*; *Kurchi*, *Bhumij*; *Tbica*, *kuti*, Kól; *Kuria*, *Kharwar*; *Pita korwa*, Uriya; " and to numbers add—  
     "C 3558. Khurdha Forests, Orissa . . . 39 lbs."
- „ 264, *Wrightia tomentosa*. To vernacular names add " *Sandikuya*, Kól; *Dudh-koraiya*, *Monghyr*; "
- „ 265. After line 2 add " C 3406, from Chaibassa, Chota Nagpore, is *Therctia nerijolia*, Juss. Bark thin, greyish brown, shining. Wood grey, moderately hard. Pores very small and small, numerous. Medullary rays very fine, very numerous, the distance between them less than the transverse diameter of the pores."
- „ 265, line 29. After " *Auk*, *Nep.*; " add " *Akhwan*, *Kharwar*; *Palati*, Kól; *Uruk*, Uriya: "
- „ 265, at line 17 from the bottom. After "purposes." add " C 3446, from the Barasand Reserve, Palamow; and C 3512, from Burkool, Khurdha, Orissa, are *Calotropis gigantea*. The bark is light yellowish-white, consisting chiefly of cork, and deeply cleft vertically. Wood white, soft. Pores small to moderate-sized, often subdivided, scanty. Medullary rays extremely fine and numerous."
- „ 268, line 20. For "Burman" read "Burm., an"
- „ 268, line 35. For "Bark  $\frac{1}{10}$  inch thick ..... scales" read "Bark  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick, black or brownish black, corky, very deeply and narrowly cleft vertically, so as to form thin ridges which easily break off."
- „ 269, *Strychnos potatorum*. To numbers add "C 3500. Khurdha Forests, Orissa."
- „ 269, *S. Nux-tomica*. To vernacular names add " *Kuchila*, Uriya; " and to numbers, add "C 3537 (63 lbs.), C 3538 (54 lbs.). Khurdha Forests, Orissa."
- „ 269. At the end of line 11 from the bottom add "C 3475, from the Koel River, Saranda, Chota Nagpore, is *Rhabdia viminea*, Dalzell. It has a soft white wood, with scanty pores, often subdivided or in short radial lines. Medullary rays extremely fine, very indistinct."
- „ 270, *Cordia Myxa*. To vernacular names add " *Embrúm*, Kól; "
- „ 271. *C. Macleodii*. To vernacular names add " *Renta*, *porpanda*, Kól; *Bharwar*, *belanan*, *Kharwar*; and to numbers add "C 3455. Betlah Reserve, Palamow."
- „ 273. After line 13 add "C 3497, from Ghatsila, Dhalbhúm, is *Erycibe paniculata*, Roxb. Vern. *Urumin*, Kól, a climber, with the peculiar structure of climbers: soft porous wood, large pores and moderately broad medullary rays. The woody portions are arranged in wavy concentric masses, separated by lines of cellular tissue. The bark is brown with corky lenticels."
- „ 275, *Oroxylum indicum*. To vernacular names add " *Sona*, *Hazaribagh*; *Sanpatti*, *Monghyr*; *Arengi banu*, Kól; *Sonepatta*, *Kharwar*; *Phunphuna*, Uriya; "
- „ 275, line 31. For "E 2396." read "E 2395."
- „ 277, line 3. After "Ceylon Collection" add " (marked *Spathodea longifolia*. Vern. *Daanga*, *Cingh.*) "
- „ 278, *Stereospermum chelonoides*. To vernacular names add " *Kandior*, Kól; "
- 278, *S. suarcolens*. To vernacular names add " *Kandior*, Kól; *Pandri*, *Kharwar*; " and (p. 279) to numbers add "O 1378. Gonda, Qudh."

- Page 279, line 16 from the bottom For "B 2355" read "B 2235 "
- „ 280, line 6 from the bottom For "*Ban marua*" read "*ban marua*"
- „ 280, foot-note. For "Linn , Soc. read "Linn Soc."
- „ 281, *Adhatoda Vasica* To vernacular names add "*Basung, Uriya,*"
- „ 282, *Callicarpa arborea*. To vernacular names add "*Búndún, Kól, Bogodí, gogdí, Kharwar, Boropatri, Uriya,*" and to numbers add "C 3445 Seemah Reserve, Palamow, Chota Nagpore "
- „ 292 Before line 5 from the bottom insert "C 1204 Khandwa, Central Provinces "
- „ 295 At the end " of *PREMNA* add "C 3578, from the Khurdha Forests, Orissa Vern *Agabathu, Uriya,* is a species of *Premna*, near *P latifolia*, which it resembles in structure Bark light yellowish-brown, thin "
- „ 295, *Gmelina arborea* To vernacular names add "*Kasamar, Kól,*" and (p 296) to numbers add—  
     "C 3549 Khurdha Forests, Orissa . . . 37 lbs  
     "E 3605, E 3620 Darjeeling Terai "
- „ 297, *Vitex Negundo* To vernacular names add "*Ehúri, Kól, Sindwar, Kharwar, Samálu, Monghyr,*"
- „ 297, *V. altissima* To vernacular names add "*Simyanga, gua, Kól,*"
- „ 297, *V. pubescens* To vernacular names add "*Muria, Uriya,*" and to numbers (page 298) add—  
     "C 3550. Khurdha Forests, Orissa . . . 52 lbs "
- „ 299, line 3. After "*Mechi,*" add "*Kyla marsal, Kól, Anguti, Uriya,*"
- „ 302, NYCTAGINÆ At end add "C3507, from the Khurdha Forests, Orissa, is *Pisonia aculeata*, Linn Vern *Hatí ankusa, Uriya* It has a very  
     arranged, very large, single  
     of 3 moderate sized pores  
     the medullary rays are very  
     and subdivide the pores
- „ 309, *Machilus odoratissima* To numbers add "E 3634 Darjeeling, 7,000 ft."
- „ 310, line 25 For "O 1378," read "O 1373 "
- „ 310, *Tetranthera monopetala* To vernacular names add "*Poyo, hayam, Kól,*"
- „ 311. After " " read "C 3521 from the Khurdha Forests, Orissa, is  
     Bark  
     rained.  
     oughly  
     led by  
     ad "
- „ 313, line 11 After "42 lbs " add "This species is not a *Daphnidium*, but *Lindera heterophylla*, Meissn "
- „ 325, line 23 For "E 3377" read "E 3317."
- „ 327, *Streblus asper* To vernacular names add "*Hara sayung, Kól,*" and to numbers add "C 3577 Khurdha Forests, Orissa."
- „ 327, *Plecosperrum spinosum* To vernacular names add "*Banabana, Uriya,*"
- „ 329, line 16 For "E 3376" read "E 3396."
- „ 329, *Artocarpus integrifolia* To vernacular names add "*Porós, Kól,*"
- „ 330, *A. Lakoocha* To vernacular names add "*Dao, Kól,*"
- „ 331, line 7 from bottom For "W 755" read "W 758" and after line 7 from the bottom insert "W 1208 South Kanara (*saphrings*) "
- „ 332, line 30 Omit "and W 729 from South Kanara," and for "  
     read "resembles

- Page 333, *Ficus bengalensis*. To vernacular names add "*Bai, Kól* ;"
- „ 334, *F. infectoria*. To vernacular names add "*Baswesa, Kól* ;"
- „ 335, *F. religiosa*. To vernacular names add "*Hesar, Kól* ; *Jari, Uriya* ;"
- „ 336, *F. retusa*. To vernacular names add "*Butisa, Kól* ;"
- „ 338, *F. virgata*. To numbers add "II 148. Sainj, Simla, 3,000 feet."
- „ 339, *F. Cunia*. To vernacular names add "*Riu, ain, Kól* ; *Poro dumer, Kharwar* ;"
- „ 339, *F. glomerata*. To vernacular names add "*Lóa, Kól* ; *Dumer, Kharwar* ;"
- „ 340, *F. Roxburghii*. To vernacular names add "*Kotang, Kól* ;"
- „ 340, *F. hispida*. To vernacular names add "*Kotang, sosokera, Kól* ;"
- „ 341, at the end of *FICUS* add—

"E 3334 from Darjeeling, 7,000 ft., is *F. Fieldingii*, Miq., a common tree of the Hill forests of the N. E. Himalaya, whose leaves are much used for fodder. It has a thin, grey bark; wood white, close grained, soft. Pores moderate-sized, very scanty. Alternating wavy bands of soft and firmer tissue prominent. Medullary rays short, moderately broad.

"E 3612 from Chenga Forest, Darjeeling, 1,500 ft., is *F. clavata*, Wall. It has a very thin, smooth, greenish-grey bark. Wood white, moderately hard, close-grained, lustrous. Pores moderate-sized, scanty, often subdivided and enclosed in a ring of white tissue. Alternating layers of white, soft, and firmer dark tissue, very regular. Medullary rays fine to moderately broad, very short, white."

- „ 341, line 12. For "2075" read "2975."
- „ 342, *Ulmus integrifolia*. To vernacular names add "*Daurango, Uriya* ;"
- „ 344, *Sponia orientalis*. To vernacular names add "*Rarunga, Kól* ;"
- „ 347, line 18 from the bottom, after "*Beng.* ;" add "*Hara sejum, Kól* ; *Sikat, Kharwar* ; *Mahkoá, Monghyr* ;"
- „ 348, line 27, after "*Vern.*" insert "*Simul aloo, simul turiól, Beng.* ;"
- „ 349, *Antidesma Ghæsembilla*. To vernacular names add "*Mata suré, Kól* ;"
- „ 352, *Phyllanthus Emblica*. To vernacular names add "*Meral, Kól* ;" and to numbers add—

"C 3539. Khurdha Forests, Orissa . . . 58 lbs."

- „ 353. At the end of "*PHYLLANTHUS*," add "C 3485, from the Kolhán Forests, Singbhúm, Chota Nagpore, and C 3501 and C 3553, from the Khurdha Forests, Orissa, are *Phyllanthus lanceolarius*, Müll. Arg. Vern. *Marang mata, Kól* ; *Kalchua, Uriya*. Bark brown, longitudinally cleft, soft. Wood reddish brown, moderately hard. Pores small and moderate-sized, scanty, in radial lines between the fine medullary rays. The distance between the rays is equal to, or less than, the transverse diameter of the pores. Weight, our specimen 'C 3553' gives 56 lbs. per cubic foot.

"C 3451, from the Betlah Reserve, Palamow, is *Breynia rhamnoides*, Müll. Arg. Bark greyish brown, fibrous. Wood reddish brown, hard, close-grained. Pores small, in radial lines between the numerous, fine medullary rays."

- „ 353, last line. For "E 5469" read "E 2469."
- „ 356, *Briedelia retusa*. To vernacular names add "*Kharaka, kaka, Kól* ; *Karika, Bhumij* ; *Kanj, kaji, Kharwar* ; *Káj, Monghyr* ;"
- „ 357, line 8. After "*Ceylon Collection*" add "(marked *B. spinosa*. Vern. *Kettekale, Cingh.*)"
- „ 357. *Briedelia tomentosa*. To numbers add "C 3498. Dhalbhúm, Chota Nagpore."

- Page 357. At the end of *BRIEDELIA* add "C 3503 from the Khurdha Forests, Orissa, is *Briedelia stipularis*, Bl Vern *Gour kassi*, Uriya Bark brown, Wood greyish brown, moderately ha or in short radial lines Medullar distributed, the distance between 1 meter of the pores Numerous very fine, concentric, transverse bars across the rays "
- „ 358, *Lebedieropsis orbicularis* To vernacular names add "*Parasu, pás*, Kól, *Kergail*, Kharwar," to numbers add "C 3452. Betlah Reserve, Palamow, Chota Nagpore;" and in line 18 after "poisonous," add "and in Singbhúm is so used by the Ho Kols, as also the root, mixed with salt."
- „ 359, line 9, after "Nep," add "*Kurti, konya, kuli*, Kól, *Putila*, Bhumij, *Putri*, Kharwar, *Puter*, Monghyr,
- „ 359, *Croton caudatus*. To vernacular names add "*Wusta*, Uriya,"
- „ 359, line 5 from bottom. After "smaller" add "C 3458, from Chandwa, Tori, Chota Nagpore, is this It has a yellow wood, pores moderate sized, scanty, single or subdivided, or in groups of 3 to 4, and medullary rays fine and very fine, very numerous Wavy concentric bands of white tissue "
- „ 359, *Trewia nudiflora* To vernacular names add "*Kurong*, Nep, *Gara lohadaru*, Kol, *Gamhár*, Monghyr, *Monda*, Uriya "
- „ 363 *Ricinus communis* To vernacular names add "*Bindi*, Kól,"
- „ 365, *Jatropha Curcas*. To vernacular names add "*Kulejera, totka bendi*, Kól,"
- „ 366, After *CHELOCARPUS* insert "C 3548, from the Khurdha Forests Orissa, is *Gelonium lanceolatum*, Willd., Roxb Fl Ind iii 831, Beddome ccciv Vern *Kakra*, Uriya, *Suragada*, Tel. It is a pretty evergreen tree of the Eastern Circars and Orissa, and has a yellow, smooth, close and even grained wood, which weighs 50 lbs per cubic foot and has a peculiar waxy smell The pores are moderate sized, scanty, sometimes subdivided The medullary rays are very fine, very numerous, and are joined by very faint, fine, white lines Growth moderate, 6 rings per inch of radius "
- „ 369 After line 3 insert "C 3509, from Khurdha Forests, Orissa, is *Euphorbia Tirucalli*, Linn Vern *Séju* Bark brown or greenish brown Wood white or grey, moderately hard Pores small, single or subdivided, scanty. Medullary rays extremely fine and numerous "
- „ 369, line 5 After "Baillon" add "The Box Tree "
- „ 372, line 17 from the bottom After "roofing houses" add "(H 130, Rotang Pass, Kulu, 9,000 ft)"
- „ 372, line 10 from the bottom For "E 2404" read "E 2403 "
- „ 373, line 6 For "E 2914" read "E 2904", and line 7, for "E 2405" read "E 2404 "
- „ 374, line 13 For "E 2406." read "E 2405 "
- „ 375, line 12. For "*S serphyllum*" read "*S serpyllum*"
- „ 375, *Salix tetrasperma* To vernacular names add "*Nachal*, Kól, *Cheur*, Kharwar,"
- „ 379, line 18 For "H 3138" read "H 3188 "
- „ 380, line 8 For "*Vulgaris*" read "*vulgaris*" and line 9, for "*Castanea Vesca*" read "*Castanea vulgaris*"
- „ 384, *Quercus dilatata*. To numbers add "H 777. Kalatop Forest, Punjab, 7,000 ft "
- „ 386, *Q. acuminata* To numbers add "E 3384, Darjeeling, 6,500 ft "

Page 392, *Juglans regia*. To numbers add "H 7. Theog, Simla, 5,000 ft."

„ 392, line 3 from the bottom. For "H 41" read "H 35."

„ 393, after line 4 add "E 3587, E 3632, Darjeeling, 7,000 ft. The latter is from a planted tree and shews 15 rings to a radius of  $4\frac{1}{2}$  inches, or  $3\frac{1}{4}$  rings per inch of radius."

„ 408, line 8. For "H 2898." read "H 2896."

„ 409, after line 26, add "Our No. E 2437 shewed, on the round, a mean diameter of 22 inches corresponding to 134 years or 13 rings per inch of radius. This agrees with several other measurements made in the Singalila Forests in Darjeeling, though at a lower elevation the growth is faster. Twelve rings per inch may be, therefore, taken as an average rate of growth for the Sikkim Silver Fir forests."

„ 410 line 16. After "above Ghát." add "C. *Lawsoniana*, Murray, is cultivated and grows well at and around Darjeeling."

„ 410, line 6 from the bottom. After "Gamble 83." add "The Funereal Cypress."

„ 411, line 10. At the beginning add "E 3615 from Rangitum, Darjeeling, 7,000 ft., and " and for "is" write "are"

„ 411, line 20. After "Wood soft," add "white, with a brown, often almost black, heartwood,"

„ 412, last line. For "H 127." read "H 129."

„ 415, line 8, after "Cutlack," add "*Rengua*, Uriya." and in line 10, for "Mid." read "Miq."

„ 418, line 11. For "talll" read "tall"

„ 419, line 6. After "Hind.;" insert "*Keeta*, Kól;"

„ 421, line 14 from the bottom. For "ENTINCKIA" read "BENTINCKIA"

„ 423, *Calamus tenuis*. To vernacular names add "*Jali*, Cachar;" and to numbers add "(E 1298. Cachar)."

„ 424, *C. Mastersianus*. As number add "(E 1299. Cachar)."

„ 424, *C. Jenkinsianus*. To vernacular names add "*Gallah*, Cachar;" and to numbers "(E 1300. Cachar)."

„ 426, line 16 from the bottom. For "E 1354," read "E 1351, 1354,"

„ 427, line 24 from the bottom. After "Beng.;" insert "*Pepesiman*, Kol;" and for "E 1329" read "E 1328."

„ 428, line 12. After "Hind.;" insert "*Katanga*, Kól;"

„ 428, line 16 from the bottom. After "E 3428" add "E 1327;" and line 15, for "E1314" read "E1312"

„ 430, line 10. After "Beng.;" insert "*Mathan*, saring, buru mat, Kól; *Bukhar*, Palamow (the clump);"

„ 430, line 17. After "basket work." add "(B 1322, Burma. P 1352, Hoshiarpur, Punjab.)"

„ 430, line 12 from the bottom. After "E 1341" add "E 1466."

„ 431, line 28. For "CRYPTOGAMIÆ." read "CRYPTOGAMÆ."

„ 432, line 21. For "*Brainea insignis*" read "*Brainea insignis*"

Under their proper places add E 3593, *Beilschmiedia Roxburghiana*; E 3597, *Ehretia Wallichiana*; E 3600, *Terminalia belerica*; E 3603, *Stereospermum chelonoides*; E 3607, *Quercus pachyphylla*; E 3609, *Quercus annulata*; E 3610, *Echinocarpus duscarpus*; and E 3611, *Lagerströmia parviflora*,—all from Darjeeling.

## THEORY

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Kumaun

1 CLEMATIS, Linn

Of this and the neighbouring genus, *Naravelia* 22 species occur in India. They are distributed almost all over India, 11 are found in the North West Himalaya, 14 in the Eastern Himalaya and Khasia Hills, 2 in Central India, 4 in the Dehkan, 4 on the Western Coast and 10 in British Burma.

Roy  
C  
with  
is conspicuous for its woolly leaves and large soft tomentose bell shaped flowers. In  
the Eastern Himalayas - 11,000 ft. - 14,000 ft.  
T  
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16

per cubic foot for *C. Vitalba*, Linn, the European Clematis, or Traveller's Joy

- 1 *C montana*, Ham., Hook Fl Ind : 2, Gamble 1. Vern *Ghantsidi*, Hind  
H 2851 Mahasu Simla 8 000 ft  
2 *C barbellata*, Edgew., Hook Fl Ind : 3  
H 2852 Mahasu Simla 8 000 ft  
H 3156 Theog Simla 7 000 ft. 40 lbs.  
3 *C grata*, Wall., Hook Fl Ind : 3 Vern *Ghantsidi*, Hind  
H 2850 Simla 6 000 ft  
4 *C Buchananiana*, DC., Hook Fl Ind : 6, Kurz : 17, Gamble 1.  
H 2838 Simla, 6 000 ft

Woody climbers, with a fibrous bark and a porous yellowish-white wood, with broad or very broad medullary rays and pores which vary from small to very large.

## ORDER II. DILLENIACEÆ.

An order of three Indian genera, belonging to two tribes, viz.,—

- Tribe I.—*Delimeæ* : : : : : *Delima* and *Tetracera*.  
 „ II.—*Dilleniæ* : : : : : *Dillenia* and *Wormia*.

*Delima sarmentosa*, Linn.; Hook. Fl. Ind. i. 31; Kurz i. 22; Gamble 2 (*Tetracera sarmentosa*, Roxb. Fl. Ind. ii. 645) Vern. *Monkyourik*, Lepcha, is an evergreen rough-leaved climber of Northern and Eastern Bengal, Burma and the Andamans. *Tetracera* includes two species: *T. lavis*, Vahl.; Hook. Fl. Ind. i. 31 (*T. trigyna*, Roxb. Fl. Ind. ii. 645), a climber of the forests of Malabar; and *T. Assa*, DC.; Hook. Fl. Ind. i. 31; Kurz i. 22, a scandent shrub of Chittagong. *Wormia* is found in Ceylon.

## 1. DILLENNIA, Linn.

Eight species. *D. bracteata*, Wight; Hook. Fl. Ind. i. 37 (*D. repanda*, Roxb. Fl. Ind. ii. 652). *Wormia bracteata*, Beddome t. 115) is a handsome tree of South India. *D. pulcherrima*, Kurz i. 19; Hook. Fl. Ind. i. 37. Vern. *Byoo*, Burm., is a handsome deciduous tree of Pegu and Martaban, chiefly in the Eng forests, which Kurz evidently identifies with No. 2 of Brandis' Burma List of 1862 (*Bjooben*): weight 69 lbs., wood hard and strong, and used for rice-mills. *D. scabrella*, Roxb. Fl. Ind. ii. 653; Hook. Fl. Ind. ii. 38; Kurz i. 21. Vern. *Akachi*, Gáro, is a deciduous tree of Assam, Eastern Bengal and Chittagong. *D. parviflora*, Griff.; Hook. Fl. Ind. ii. 38; Kurz i. 21. Vern. *Lingyan*, Burm., is a deciduous tree of the mixed forests of Burma up to 2,000 feet.

Wood characterized by prominent medullary rays which appear as high, shining plates on a vertical section, giving the wood a remarkably mottled appearance. The rays are generally of two sizes and the pores are small, the distance between the rays being greater than the diameter of the pores.

1. *D. indica*, Linn.; Hook. Fl. Ind. i. 36; Brandis 1; Kurz i. 19; Gamble 1. *D. speciosa*, Thunb.; Roxb. Fl. Ind. ii. 650; Beddome t. 103. Vern. *Chalta*, Hind.; *Chalta*, *hargesa*, Beng.; *Phamsikol*, Lepcha; *Otengah*, Ass.; *Rai*, Uriya; *Uva*, Tam.; *Uva*, *pedda-kalinga*, Tel.; *Syalita*, Mal.; *Mota karmal*, Mar.; *Hondapara*, Cingh.; *Thapru*, *chauralesi*, Magh; *Thabyoo*, Burm.; *Carlloo*, Taleing.

A large evergreen tree. Bark red, peeling off in small hard flakes. Wood red with white specks, close-grained, moderately hard. Pores moderate-sized, numerous, uniformly distributed. Medullary rays of two classes, broad and extremely fine, a large number of fine ones between two broad ones. Two or more lines of pores between each pair of broad rays. The medullary rays are visible on a radial section, giving the wood a mottled appearance, but not to the same extent as in *D. pentagyna*.

Bengal, Central and South India, Burma; often planted for ornament.

Growth moderate, our specimens shew seven rings per inch of radius. The weight and transverse strength have been determined by the following experiments:—

	Weight.	P
Skinner, No. 58, in 1862, in South India . . . . .	found 45 lbs.,	721
Kyd in 1831 with Assam wood, bars 2' x 1" x 1" . . . . .	45 „	243 (doubtful)
Brandis, in 1862, Burma List, No. 3 . . . . .	41 „	...
Smythies, in 1878, with our four specimens . . . . .	44.5 „	...

E 596	Khookloong Forest Darjeeling Terai	lbs
E 2310	Sivoke Forests Darjeeling Terai	40
E 1390	Chittagong	41
E 1390	Chittagong	48
B 2001	Burma	49

2 *D. pentagyna*, Roxb Fl Ind 11 602, Hook Fl Ind 1 38, Beddome t 104, Brandis 2, Kurz 1 21, Gamble 2 *D. augusta*, Roxb l c Vein *Aggar*, Oudh, *Kallai*, C P, *Karkotta*, Beng, *Sukaruk*, Bori, C P *Tatru*, Nep, *Shukni*, Lepcha, *Akshi*, Ass, *Mechi*, *Akachi*, Garo *Rai*, Uriya, *Rai pinnai*, *nai tes*, Tum, *Rawadan chinakalinga* Tel, *Kanagalu Mai*, *Mirchi*, Baigas *Kallei*, Gondi, *Malegeru*, Kurg, *Machil*, Kan, *Zambrun* Magh, *Zimbyun* Burm

A deciduous tree Bark  $\frac{1}{2}$  inch thick, grey or pale brown, smooth inner substance red Wood rough, moderately hard, reddish grey, apt to split, warp and crack, strong heavy, durable, handsomely marked on a vertical section by the darker coloured medullary rays which appear as broad plates Pores small and moderate sized, many of them filled with a white substance, which is visible both on the horizontal and vertical sections, and is one of the characteristics of the wood Medullary rays numerous, moderately broad, with a few intermediate, very fine rays Annual rings marked by a narrow belt in the outer edge (autumn wood) without pores, this is particularly distinct in the wood from Oudh, less so in the specimens from Burma

experiments —					of radius very large following	
C	1000	C	1 1/2 2 N 57	found	Weight lbs	P =
					70	907
					58	960
					45	593
					48	"
in 1864 with Burma wood (4 experiments)						
bars 3 x 1" x 1"						
					45	740
Smythes in 1878 with our six specimens						
					47 5	

is of  
plate  
found with sal

O 318	Gorakhpur (1868)	lbs
E 608	Rakti Forest Darjeeling Terai	54
E 2311	Sivoke Darjeeling Terai	45
B { 302 }	Burma (1867)	54
B { 303 }	Burma (1867)	47
B 557	Prome Burma	38

3 *D. aurea*, Smith, Hook Fl Ind 1 37, Brandis 2, Kurz 1 20 *D. ornata*, Wall Vern

A large tree Bark beautifully mottled and wavy



very small, often in short radial lines. Medullary rays broad, with a few intermediate very fine rays. Annual rings very indistinct. The wood differs from that of *D. indica* and *D. pentagyna* by smaller pores and narrower medullary rays.

Nepal, Bengal, Burma and Andaman Islands.

Weight: according to Benson, 44 lbs.; Brandis, 45 lbs.; our specimens give 48 to 49 lbs. Benson gives  $P = 834$ . Wood not used.

B 2502.	Burma (1862)	:	:	:	:	:	:	lbs.
B 2253.	Andaman Islands (1866)	:	:	:	:	:	:	49
								48

4. *D. retusa*, Thunb.; Thwaites Enum. 5; Hook. Fl. Ind. i. 37. Vern. *Godapara*, Cingh.

A tree. Wood resembling that of the other species.

Ceylon, up to 2,000 ft.

Weight according to A. Mendis, 51 lbs. per cubic foot. Wood used for building-

No. 29, Ceylon collection	.	.	.	.	.	.	.	lbs.
								51

Two specimens, B 2245 (52 lbs.) and B 2275 (44 lbs.), sent by Major Ford from the Andaman Islands in 1866 under name of *Lingyau*, have a structure similar to that of *D. aurea*, but the wood is purplish grey and may possibly belong to *D. pilosa*, Roxb. (Kurz i. 20) which, according to Kurz, is a large tree of the Andamans.

## 2. WORMIA, Rottb.

1. *W. triquetra*, Rottb.; Thwaites Enum. 4; Hook. Fl. Ind. i. 35. Vern. *Diyapara*, Cingh.

Wood reddish, in structure resembling that of *Dillenia*.

Ceylon, up to 2,000 ft.

Weight 44 lbs. per cubic foot. Wood used for building; the nut gives an oil.

No. 22, Ceylon collection	.	.	.	.	.	.	.	lbs.
								44

## ORDER III. MAGNOLIACEÆ.

Contains 8 genera of Indian trees, shrubs or climbers, which are chiefly found in the Eastern Himalaya and the Eastern moist zone. The order is divided into 4 tribes, viz.,—

Tribe I.—Trochodendreæ	.	.	.	.	.	<i>Euptelea</i> .
„ II.—Winteræ	.	.	.	.	.	<i>Illicium</i> .
„ III.—Magnoliæ	.	.	.	.	.	<i>Talauma</i> , <i>Magnolia</i> , <i>Manglietia</i> and <i>Michelia</i> .
„ IV.—Schizandreæ	.	.	.	.	.	<i>Schizandra</i> and <i>Kadsura</i> .

Four of these genera contain only shrubs or woody climbers: *Euptelea pleiosperma*, Hook. f. and Th.; Hook. Fl. Ind. i. 39, is a shrub of the higher Mishmi Hills; *Illicium* contains two shrubs; *I. Griffithii*, Hook. f. and Th. of the Khasia Hills, and *I. majus*, Hook. f. and Th.; Kurz i. 23, of the Thoungyeen Hills in Tenasserim; *Schizandra*, 4 climbing species of the Eastern Himalaya, of which *S. grandiflora*, Hook. f. and Th.; Hook. Fl. Ind. i. 44; Brandis 571; Gamble 3. Vern. *Klandru*, *kalyendru*, Simla; *Sillangti*, Kumaun; *Singhata*, *taksiebrik*, Lepcha, with edible fruits, extends as far west as Simla (H. 3,029, Nagkanda, 9,000 ft., with a porous wood and strong resinous smell); and *Kadsura*, two climbers of Assam and Malabar respectively. Of the remaining genera, three are here described, the last, *Manglietia*, containing two large trees;

Mr. J. W. R. H. I. Ind. AG. 1905. 05. 14. F. 1. m. H. m. 1. m. 1. m.

among such are *Liriodendron tulipiferum*, the well known tulip tree and several handsome Magnolias

Wood soft, generally rough. Pores generally small, uniformly distributed. Medullary rays sharply marked, fine. The annual rings are generally marked by a clearly defined line, or narrow belt of soft texture. The structure of the different species of this order is so uniform that no attempt has been made to give generic characters.

1 TALAUMA, Juss

*T. Rabaniana* Hook f and Th. Hook Fl Ind 1 40 Kurz 1 24 Vern Sappa Ass is a large tree of the Khasia Hills and Burma whose wood is sometimes used in Assam for furniture and planking and *T. mutabilis* Bl Hook k1 Ind 1 40 (*T. Candollei* Bl Kurz 1 24) a shrub of Tenasserim and Tavoy. Most of the species are remarkable for their large fragrant flowers.

1 T Hodgson, Hook f and T, Hook Fl Ind : 40, Gamble 8  
Vern *Sissoo*, Lepcha, *Harre*, Nep

An evergreen tree      Bark grey,  $\frac{1}{8}$  inch thick, smooth      Wood grey,  
very soft, even grained      Annual rings distinct      Pores small      Medullary  
rays fine and very fine

Sikkim Himalaya from the Terai up to 6 000 ft      Khasia Hills

Growth moderate 7 rings per inch of radius Weight 21 lbs per cubic foot

E 3100	Darjeeling 5 000 ft		lbs 21
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## 2 MAGNOLIA, Linn

Besides the species given below *M. globosa* Hook f and Th Hook Fl Ind 1 41 Gamble 2 is a small tree of the inner ranges of the Sikkim Himalaya, *M. Griffithii* Hook f and Th Hook Fl Ind 1 41 an evergreen tree of the forests 41 Kurz 1 21 *mtari* Ass *Duli* of the base of the

1 M Campbell, Hook f and Th, Hook Fl Ind: 41, Gamble 2  
Vern *Lal champ* Nep *Sigumgrip*, Lepcha, *Pendder*, Bhutia

A large, tall, deciduous tree. Bark dark coloured, that of the branches black. Wood white, very soft. Annual rings distinctly marked by prominent white lines. Pores small. Medullary rays moderate-sized, prominent.

Sil kim and Bhutan from 7 000 to 10 000 feet Growth moderate 11½ rings per inch of radius Weight 25 lbs per cubic foot Wood occasionally used for planking, but now scarce Chiefly remarkable for its magnificent large pink or white flowers, which appear in April

E 365	Rangyrum Forest	Darjeeling	7 500 feet	lbs 23
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3 MICHELIA, Linn.

Includes the 5 species described below *M. Kusopa* Ham Hook Fl Ind : 43  
of Nepal. A skin in  
ood is yellowish & used  
*M. punduana* Hook

f. and Th.; Hook. Fl. Ind. i. 43, is found in the Khasia Hills; and *M. nilagirica* Zenk; Hook. Fl. Ind. i. 44; Beddome t. 62. Vern. *Pila champa*, Hind., Mar.; *Shembugha*, Tam.; *Walsapu*, Cingh., with a strong, fine-grained wood, used for building, beams and rafters, in the higher forests of the Western Gháts and Ceylon.

1. *M. Cathcartii*, Hook. f. and Th.; Hook. Fl. Ind. i. 42; Gamble 2. Vern. *Kala champ*, Nep.; *Atokdúng*, Lepcha.

A large tree, with dark-coloured bark. Sapwood large, white, heartwood dark olive brown, moderately hard. Annual rings distinctly marked by a white line. Pores small. Medullary rays fine, not very prominent.

Sikkim Himalaya, 5,000 to 7,000 feet.

Weight 41 lbs. Wood used for planking, will do well for tea boxes. The flowers are terminal, white, but turn red in drying.

E 2314.	Rangbúl Forest, Darjeeling, 6,500 feet	lbs.
		41

2. *M. Champaca*, Linn.; Hook. Fl. Ind. i. 42; Roxb. Fl. Ind. ii. 656; Beddome vi; Brandis 3; Kurz i. 25; Gamble 3. Vern. *Champa*, Hind.; *Oulia champ*, Nep.; *Titasappa*, Ass.; *Champa, champaka*, Beng.; *Shimbu, sempangam*, Tam.; *Champakamu, sampenga, kanchanamu*, Tel.; *Sampighi*, Kan.; *Champakam*, Mal.; *Tsaga*, Burm.

A tall evergreen tree, with grey bark,  $\frac{1}{2}$  inch thick. Wood soft, seasons and polishes well; sapwood white; heartwood light olive brown; annual rings distinctly marked by a white line. Pores small and moderate-sized, equally distributed. Medullary rays short, fine to moderately broad, visible on a radial section.

Cultivated throughout India from the Ravi southwards and up to 5,400 feet in the North-West Himalaya. Wild in Nepal, Bengal, Assam (ascending to 3,000 feet), Burma, and in the forests of the Western Gháts as far as Kanara.

Growth moderate, our specimens shew seven rings per inch of radius. It often reaches 8 feet girth at an age of 100 to 120 years.

Weight: the mean of 7 experiments made by Brandis in 1864 gave 37 lbs. per cubic foot; Puckle's experiments in Mysore gave 42 lbs.; while Smythies found 38 lbs. per cubic foot as the average of our specimens. In Brandis' experiments of 1864 on Nepal wood, 4 with bars  $6' \times 2'' \times 2''$  gave  $P = 564$ , while 3 with bars  $6' \times 2'' \times 1\frac{1}{2}''$  gave  $P = 561$ . Puckle's in Mysore with bars  $2' \times 1'' \times 1''$  gave  $P = 642$ .

The wood is very durable: *e. g.*, specimen No. 1437 was cut by Griffith in 1836 and has been since then in Calcutta, and is now as sound as if fresh cut. The wood is used for furniture, house-building, carriage work and native drums. It is considered valuable in Northern Bengal for planking, door-panels and furniture; and in Assam for building and canoes. The flowers are prized on account of their sweet scent, and the tree is planted at Hindu shrines.

E 576.	Khokloong Forest, Darjeeling Terai	lbs.
E 2313.	Sukna Forest, Darjeeling Terai	35
E 2195.	Nowgong, Assam	37
E 1049.	Eastern Dúars, Assam	40
E 1437.	Mishmi Hills (Griffith, 1836)	36
		42

3. *M. excelsa*, Blume; Hook. Fl. Ind. i. 43; Gamble 3. Vern. *Bara champ*, *safed champ*, Nep.; *Sigugrip*, Lepcha; *Gók*, Bhutia.

A lofty deciduous tree. Bark greyish brown,  $\frac{1}{3}$  inch thick. Wood soft; sapwood small, white; heartwood olive brown, glossy; annual rings distinctly marked by firmer autumn wood with fewer pores. Pores small. Medullary rays short, fine and moderately broad, very numerous, prominent on a radial section. According to Gamble, the wood is yellow when fresh cut.

cut

Used for building, but chiefly for planking, door and window frames, and for furniture. The principal building and furniture wood of the Darjeeling Hills

E 657.	Chuttockpur Forest, Darjeeling, 6,000 feet	33
E 2312	Rangbül Forest, Darjeeling, 7,000 feet	33
E 1442	Mishmi Hills (Griffith, 1836).	34

4. *M. lanuginosa*, Wall.; Hook. Fl. Ind. i. 43; Gamble 2. Vern. *Gogay champ*, Nep.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, greyish brown, smooth. Wood grey, soft, shining. Pores small, scanty. Medullary rays fine and very fine, closely packed. Narrow concentric (annual?) rings of soft texture, often confluent.

Forests of Sikkim and the Khasia Hills from 5 000 to 7,000 feet  
Growth moderate Weight 27 lbs per cubic foot

E 3099	Darjeeling, 7,000 feet	27
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5. *M. oblonga*, Wall.; Hook. Fl. Ind. i. 43. Vern. *Sappa*, *phul-sappa*, Assam.

A tree. Sapwood white; heartwood dark grey, soft. Annual rings indistinct. Pores moderate-sized, often in short radial lines. Medullary rays fine, uniform, closely packed, equidistant, the distance between two rays less than the transverse diameter of the pores.

Khasia Hills and Assam

Weight, 40 lbs per cubic foot. The wood is used in Assam for canoes and rough furniture

E 1268	Lakhampur, Assam	40
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## ORDER IV. ANONACEÆ.

This order contains 21 Indian genera, the majority of which are South Indian and Burmese.

They belong to 5 tribes, viz.—

Tribe	I—Uvarieæ	<i>Uvaria</i> and <i>Ellipcia</i>	
"	II—Unoneæ	<i>Cyathocalyx</i> and <i>Alphonsa</i>	7a, 7b.
"	III—Mitrephoreæ		10.
"	IV—Xylopiæ		
"	V—Miliuseæ	<i>Amusa</i> , <i>Saccolpetalum</i> , <i>Alphonsa</i> , <i>Orophea</i> and <i>Bocagea</i>	

*botr* trees; five, *Uvaria*, *Ellipcia*, *Artal-*  
*Cyc* limbing shrubs; fifteen, *Cyathocalyx*,  
*lam* *Alphonsa*, *Popowia*, *Phacanthus*, *Quinlothu-*  
*Orophea*, *Cananga*, *Alphonsa* and  
*Bocagea*, are shrubs or trees. In Northern and Central India the family is represented

by 4 species of *Polyalthia*, 3 of *Anona*, 2 of *Saccopetalum* and *Miliusa velutina*. The Eastern Himalaya, Assam and Eastern Bengal, contain trees, shrubs or climbers of the genera *Uvaria*, *Artabotrys*, *Anona*, *Polyalthia*, *Melodorum* and *Miliusa*, while the remaining genera, and the majority of the species of these, are found in South India or Burma.

Of the genera not herein described, the five climbing ones contain about 30 species, the principal of which are: *Uvaria macrophylla*, Roxb. Fl. Ind. ii. 663; Hook. Fl. Ind. ii. 49; Kurz i. 28. Vern. *Bagh-runga*, Beng.; *Thabwot-mway*, Burm., a large evergreen climber common in Eastern Bengal and Burma; *Ellipeia ferruginea*, Hook. f. and Th.; Hook. Fl. Ind. i. 52 (*Uvaria ferruginea*, Ham.; Kurz i. 29), a shrub of the Irrawaddy valley; and *Artabotrys odoratissimus*, R. Br.; Hook. Fl. Ind. i. 54; Kurz i. 31 (*Uvaria odoratissima*, Roxb. Fl. Ind. ii. 666), a large Burmese shrub with fragrant flowers. *Cyathocalyx martabanicus*, Hook. f. and Th.; Hook. Fl. Ind. i. 53; Kurz i. 30, is an evergreen tree of Martaban and Tenasserim. *Cananga odorata*, Hook. f. and Th.; Hook. Fl. Ind. i. 56; Kurz. i. 33 (*Uvaria odorata*, Roxb. Fl. Ind. ii. 661) Vern. *Kadupnam*, Burm., is a large evergreen tree of Tenasserim. *Unona* contains seven Burmese and three South Indian trees. *Popowia* two, viz.: *P. Beddomeana*, Hook. f. and Th.; Hook. Fl. Ind. i. 68 (*P. ramosissima*, Beddome viii.) of the Travancore and Tinnevely hills; and *P. Helferii*, Hook. f. and Th.; Hook. Fl. Ind. i. 69; Kurz i. 39 of the Andamans and Tenasserim. *Alphonsea* four, viz.: *A. madraspatana*, Bedd. t. 92; *A. zeylanica*, Hook. f. and Th., of South India; *A. lutea*, Hook. f. and Th., of Eastern Bengal, South India and Burma; and *A. ventricosa*, Hook. f. and Th., of Assam, Chittagong and the Andamans, all trees of considerable size. *Mitrephora grandiflora*, Beddome t. 91.; Hook. Fl. Ind. i. 78, is a large handsome tree of the South Kanara forests. There are altogether, excluding those of the Malay Peninsula and Ceylon, about 100 Indian species; of these about 60 occur in Burma, 30 in South India and 30 in Eastern Bengal. Further specimens of the wood of the larger species are urgently required for investigation and determination of doubtful woods, such as *Baman*, &c. (see p. 10).

Wood light-coloured, generally yellowish and soft. Pores small. Medullary rays fine to moderately broad, joined by numerous fine transverse bars. These transverse bars furnish an excellent character for distinguishing the wood of Anonacæ from that of most other families; they are also found in *Bassia* and *Mimusops*, but in these genera they have more the character of wavy concentric lines. The structure of the different species of this family is so uniform that no attempt has been made to give generic characters.

### 1. POLYALTHIA, Blume.

Besides the two species here described, *P. simiarum*, Bth. and Hook. f.; Hook. Fl. Ind. i. 63; Kurz i. 37, is a large tree of Eastern Bengal and Burma; *P. Jenkinsii*, Bth. and Hook. f.; Hook. Fl. Ind. i. 64; Kurz i. 37, is a common tree of the Andamans, found also in Assam and Sylhet; *P. coffeoides*, Bth. and Hook. f.; Hook. Fl. Ind. i. 62; Beddome t. 53, is a common tree of the Western Ghâts, where its bark is made into ropes; *P. suberosa*, Bth. and Hook. f.; Hook. Fl. Ind. i. 65; Brandis 5. (*Uvaria suberosa*, Roxb. Fl. Ind. ii. 667.) Vern. *Bara chali*, Beng.; *Banderhola*, Ass.; *Chilka dūdūga*, Tel., is a small tree of Oudh, Bengal and South India, with a corky bark, and close, tough, hard, durable wood, weighing, according to Brandis 40, and Kyd 45 lbs. per cubic foot, and having  $P = 430$ . There are also about 8 other species described, from India and Burma.

1. *P. longifolia*, Benth. and Hook. f.; Hook. Fl. Ind. i. 62; Beddome t. 38; Brandis 4. *Uvaria longifolia*, Lam.; Roxb. Fl. Ind. ii. 664. Vern. *Asok*, *debdari*, Hind.; *Assothi*, Tam.; *Asoká*, *devadaru*, Tel.

A large evergreen tree with smooth bark. Wood white. Pores small, often subdivided, uniformly distributed. Medullary rays short, fine to very broad. Numerous, equidistant, very fine transverse bars across the rays.

a tree throughout Bengal and South India  
lbs Brandis says between 30 and 40, our  
ents give P = 547

E 2479 Calcutta

37

2 *P. cerasoides*, Benth and Hook f, Hook Fl Ind 1 63, Bed-  
dome t 1, Brandis 5, Kurz 1 38 *Uvaria cerasoides*, Roxb Fl Ind  
n 666 Vern Hoom, Mir, Chilla dūdugu, Tel, Nakulsi, mulsi, Tam

A large evergreen tree. Wood olive grey, moderately hard, close-grained. Pores small. Medullary rays short, broad and moderately fine, the distance between the rays twice or three times as great as the transverse diameter of the pores. Numerous, very distinct, fine, equidistant, transverse bars between the rays.

Behar Eastern and Western Ghats Dekkan Burma

Weight, 52 lbs per cubic foot. The wood is used for carpentry and in boat building. It is much prized in Bombay.

C 997 Poona

158

## 2 ANONA, Linn

Besides the species given below the 'Bullock's heart' *A. reticulata* Linn.; Vern. *Ramphal* and the 'Soursop' *A. muricata* L. are also cultivated in many parts of India (Skinner No 14 gives for *A. reticulata* W = 40 lbs P = 640)

1 *A. squamosa*, Linn , Hook Fl Ind 1 78, Roxb Fl Ind 11 657,  
 Brandis 6, Kurz 1 46, Gamble 3 The Custard Apple Vern *Sharifa*,  
*sitaphal*, Hind , *Ata*, *luna*, Beng , *Sita*, Tam , *Sitapundu*, Tel , *Atta*,  
 Mal . Cingh , *Auza*, Burm

A small tree, with an erect, short trunk. Bark thin, grey. Wood soft, close grained. Pores moderate sized, scanty. Medullary rays moderate-sized, joined by numerous white transverse bars.

Introduced from the West Indies and domesticated throughout India and Burma. Cultivated for its fruit, which ripens from July to October. Weight, 46 lbs per cubic foot.

B 2317 Myanong Burma

1b  
46

## 3 MILIUSA, Lesch.

The last two runs as have a low wind of 2 to 7 mph. *Myiophobus* Hook

Western Gháts,  
1 Martaban and  
om Sikkim and

the Khasia Hills

1 *M. velutina*, Hook f and Th, Hook Fl Ind n 87, Beddome t 37, Brandis 6, Kurz 147 *Urarina villosa*, Roxb Fl Ind n 664 Vern *Hom-sal*, Hind, *Kari*, C P, *Kharrei*, Oudh, *Peddachilka dūduga*, *nalla dudūga*, Tel, *Thabutgyee*, Burm

A deciduous moderate sized tree, with a short erect trunk, in Burma a large tree. Bark  $\frac{1}{2}$  inch thick, rough. Wood yellow when fresh cut, grey or greyish brown when dry, moderately hard. Annual rings indistinct. Pores small, uniformly distributed, often in short radial lines. Medullary rays fine and moderately broad, the distance between two rays larger than the transverse diameter of the pores. Transverse bars distinct, numerous.

Sub-Himalayan tract from Nepal to the Ganges, Central India, Godaveri districts and Burma.

Brandis says, "The seasoned wood weighs from 40 to 50 lbs. per cubic foot;" Kurz gives the weight at 42 lbs.; Benson's experiments give 60; and Skinner's (No. 93) 50 lbs. Benson's experiments give  $P = 833$ , and Skinner's  $P = 839$ .

Used for carts and agricultural implements, spear-shafts and oars.

B 3062.	Prome, Burma.	.	.	.	.	.	.	.	.	lbs.
B 3122.	Burma (1862)	:	:	:	:	:	:	:	:	48
O 3113.	Dehra Dún	.	.	.	.	.	.	.	.	53

2. *M. Roxburghiana*, Hook. f. and Th.; Hook. Fl. Ind. i. 87; Kurz. i. 47; Gamble 4. *Uvaria dioica*, Roxb. Fl. Ind. ii. 659. Vern. *Sungden*, Lepcha; *Tusbi*, Sylhet.

A small tree. Bark thin, grey. Wood greyish white, hard. Pores very small, scanty. Medullary rays short, white, of all sizes, from fine to broad, very numerous, prominent on a radial section. Numerous white parallel wavy transverse bands across the rays.

Terai and valleys of the Bengal Himalaya, Khasia Hills, Chittagong and Burma. Weight 51 lbs.

E 2316:	Chunbati, Darjeeling, 2,000 feet	.	.	.	.	.	.	.	lbs.
									51

#### 4. *SACCOPETALUM*, Bennett.

Besides the species here described, *S. longiflorum*, Hook. f. and Th., is a tree of Eastern Bengal found near Purneah.

1. *S. tomentosum*, Hook. f. and Th.; Hook. Fl. Ind. i. 88.; Beddome t. 39; Brandis, 7. *Uvaria tomentosa*, Roxb. Fl. Ind. ii. 667. Vern. *Kirna*, *karri*, Hind.; *Hoom*, Bombay; *Chilkadúdú*, Tel.; *Thoska*, Gondi; *Humba*, Kurku.

A large tree with straight stem. Bark  $\frac{1}{2}$  inch thick, of various shades, sometimes black, deeply cracked. Wood olive brown, moderately hard, smooth, close-grained; no heartwood. No annual rings. Pores small and moderate-sized, numerous. Medullary rays broad and fine, very numerous, distinctly visible on a radial section as long, narrow plates, giving the wood a mottled appearance. Numerous, regular, fine, white, transverse bars across the medullary rays, the distance between the rays being a little larger than the transverse diameter of the pores.

Oudh, Nepal Terai, Gorakhpur, Behar, Central India, Western Gháts. Weight, 45 lbs. per cubic foot.

O 342.	Gorakhpur (1868)	.	.	.	.	.	.	.	lbs.
C 1109.	Ahiri Reserve, Central Provinces	.	.	.	.	.	.	.	45

The following woods cannot at present be identified, but they probably belong to this family:—

B 1949. (58 lbs.) *Bokenet* from Tavoy. A hard, close-grained, yellow wood; when seasoned it is said to shew black and white stripes, and is then called Zebra Wood. Pores small, scanty. Medullary rays fine and very fine, joined by numerous fine parallel transverse bars. Used for furniture. Scarce in the Mergui Archipelago but plentiful in the Andaman Islands.

B 2281. (32 lbs.) Received from the Andaman Islands in 1866 under the name of *Thanloong*. Pores small, often subdivided. Medullary rays moderately broad, the distance between them many times larger than the transverse-diameter of the pores. Numerous faint transverse bars. It may possibly be *Polyalthia Jenkinsii*, Bth. and Hook. f.

B 2251 (33 lbs) Received from the Andamans in 1866 under the name of *Thitpyoo*, has a white soft wood, with small, scanty pores often in short radial lines. The medullary rays are 4-12 lines thick - not a 3 line - ray - 11 "

## Anonaceae

B 2236 (53 lbs) Received from the Andamans in 1866 under the name of *Pan noo*, has a similar structure to *Bamau* Wood yellowish grey, hard Pores small, transverse diameter equal to or one half the distance between the medullary rays, which are fine and are joined by numerous transverse bars

## ORDER V. MENISPERMACEÆ

An order which, in India with the single exception of the species described below, contains only climbing plants. Of the 17 genera found in India, many contain only single species. These 17 genera belong to 4 tribes, viz.,—

Tribe I—Tinosporeae

" II — Cocculum

### III — Cissampelideae

IV — Pachygoneae

*campylus*

*Stephania*, *Cissampelos*, *Cyclea*,  
*Lophopetalum*

*achygone, Pycnarrhena, Hæmato-*  
*carpus Antilaxis*

*Anamirta Cocculus*, W and A, Hook Fl Ind 1 99, Brandis 8, Kurz 1 53

Marysville, Oreg., Batulpate, Nep., Patia, Tel., a climber common both to the old  
and new worlds, furnishes the Radix Pareira of druggists Cocculus Leaba, DC;  
Hook, Fl Ind : 109 Brande G. Voss " " " " "  
Hook :  
8141 .

**FACING  
CARBON**

"The structure of the wood of Menispermaceæ is remarkable, and differs in several respects from the wood of other Dicotyledons. The vascular bundles of a young branch (which in most Dicotyledons unite and form concentric rings of wood and liber) generally remain distinct in Menispermaceæ, and are separated by broad radial masses of cellular tissue, corresponding to the medullary rays of ordinary wood. After some time these original wood fascicles cease growing, and in the cortical cellular tissue exterior to the liber originates a second circle of bundles similar to the first formed, excepting in the absence of spiral vessels.



Sub-Himalayan tract from Nepal to the Ganges, Central India, Godaveri districts and Burma.

Brandis says, "The seasoned wood weighs from 40 to 50 lbs. per cubic foot;" Kurz gives the weight at 42 lbs.; Benson's experiments give 60; and Skinner's (No. 93) 50 lbs. Benson's experiments give  $P = 833$ , and Skinner's  $P = 839$ .

Used for carts and agricultural implements, spear-shafts and oars.

B 3062.	Prome, Burma.	.	.	.	.	.	.	.	lbs.
B 3122.	Burma (1862)	.	.	.	.	.	.	.	48
O 3113.	Dehra Dún	.	.	.	.	.	.	.	53

2. *M. Roxburghiana*, Hook. f. and Th.; Hook. Fl. Ind. i. 87; Kurz. i. 47; Gamble 4. *Uvaria dioica*, Roxb. Fl. Ind. ii. 659. Vern. *Sungden*, Lepcha; *Tusbi*, Sylhet.

A small tree. Bark thin, grey. Wood greyish white, hard. Pores very small, scanty. Medullary rays short, white, of all sizes, from fine to broad, very numerous, prominent on a radial section. Numerous white parallel wavy transverse bands across the rays.

Terai and valleys of the Bengal Himalaya, Khasia Hills, Chittagong and Burma.

Weight 51 lbs.

E 2316.	Chunbati, Darjeeling, 2,000 feet	.	.	.	.	.	.	lbs.
								51

#### 4. *SACCOPETALUM*, Bennett.

Besides the species here described, *S. longiflorum*, Hook. f. and Th., is a tree of Eastern Bengal found near Purneah.

1. *S. tomentosum*, Hook. f. and Th.; Hook. Fl. Ind. i. 88.; Beddome t. 39; Brandis, 7. *Uvaria tomentosa*, Roxb. Fl. Ind. ii. 667. Vern. *Kirna*, *karri*, Hind.; *Hoom*, Bombay; *Chilkadúdú*, Tel.; *Thoska*, Gondi; *Humba*, Kurku.

A large tree with straight stem. Bark  $\frac{1}{2}$  inch thick, of various shades, sometimes black, deeply cracked. Wood olive brown, moderately hard, smooth, close-grained; no heartwood. No annual rings. Pores small and moderate-sized, numerous. Medullary rays broad and fine, very numerous, distinctly visible on a radial section as long, narrow plates, giving the wood a mottled appearance. Numerous, regular, fine, white, transverse bars across the medullary rays, the distance between the rays being a little larger than the transverse diameter of the pores.

Oudh, Nepal Terai, Gorakhpur, Behar, Central India, Western Gháts.

Weight, 45 lbs. per cubic foot.

O 342.	Gorakhpur (1868)	.	.	.	.	.	.	lbs.
C 1109.	Ahiri Reserve, Central Provinces	.	.	.	.	.	.	45

The following woods cannot at present be identified, but they probably belong to this family:—

B 1949. (58 lbs.) *Bokenet* from Tavoy. A hard, close-grained, yellow wood; when seasoned it is said to shew black and white stripes, and is then called Zebra Wood. Pores small, scanty. Medullary rays fine and very fine, joined by numerous fine parallel transverse bars. Used for furniture. Scarce in the Mergui Archipelago but plentiful in the Andaman Islands.

B 2281. (32 lbs.) Received from the Andaman Islands in 1866 under the name of *Thanloong*. Pores small, often subdivided. Medullary rays moderately broad, the distance between them many times larger than the transverse-diameter of the pores. Numerous faint transverse bars. It may possibly be *Polyalthia Jenkinsii*, Bth. and Hook. f.

B 2236 (53 lbs) Received from the Andamans in 1866 under the name of *Pan noo*; has a similar structure to *Baman*. Wood yellowish grey hard Pores small, transverse diameter equal to or one half the distance between the medullary rays, which are fine and are joined by numerous transverse bars

*Anamirta Cocculus*, W and A , Hook Fl Ind 199, Brandis 8, Kurz 153  
 (Use names in Coccil's Parh Fl Ind 807) Vorn Kolman Hndl book 2

"The structure of the wood of Menispermaceæ is remarkable, and differs in several respects from the wood of other Dicotyledons. The vascular bundles of a young branch (which in most Dicotyledons unite and form concentric rings of wood and liber) generally remain distinct in Menispermaceæ, and are separated by broad radial masses of cellular tissue, corresponding to the medullary rays of ordinary wood. After some time these original wood fascicles cease growing, and in the cortical cellular tissue exterior to the liber originates a second circle of bundles similar to the first formed, excepting in the absence of spiral vessels.



1 *B nepalensis*, Spreng, Hook Fl Ind 1 109, Beddome xi, Brandis 12, Kurz 1 58, Gamble 5 *B pinnata*, Roxb Fl Ind ii 184 (probably) Vern *Amudanda, chiror, Pb, Chatri, milkisse, jamne-munda, Nep*

An evergreen shrub attaining in Bengal a height of 20 feet and occasionally 2 feet in girth Bark soft, corky Wood bright yellow, hard. Pores very small, arranged in radial lines or patches Medullary rays moderately broad, prominent, numerous, well marked on a radial section

E 2318 Darjeeling 7 000 ft

lbs  
49

2 *B vulgaris*, Linn, Hook Fl Ind 1 109, Brandis 11 The Barberry Vern *Zirishk, kashmal, chochar, Pb*

A deciduous thorny shrub, with soft brown bark,  $\frac{1}{2}$  inch thick Wood lemon yellow, moderately hard, even grained Annual rings marked by an irregular belt of small pores which are larger than those in the rest of the wood The pores in the main portion of the annual rings are grouped in short whitish, irregularly bent lines or tails Medullary rays fine to moderately broad, well marked on a vertical section

Himalaya from Nepal westwards in shady forests above 8 000 ft elevation Afghanistan and Beloochistan Europe

We ght our specimen gives 52 lbs per cubic foot Mathien Fl For p 12 gives 45 to 57 lbs Fruit edible The wood is a good firewood

H 3037 Mat yana Simla 9 000 ft

lbs

H 3040 Naghanda Simla 9 000 ft

55

3 *B aristata*, DC, Hool Fl Ind 1 110, Beddome xii, Brandis 12 Gamble 5 *B angustifolia*, Roxb Fl Ind ii 183 Vern *Simlu simlu, kasmal, chitra, Pb, Tsema, Bhutia, Chitra, Nep, Chotra, Hind*

An erect spinous shrub Bark soft, light brown, corky Wood yellow, hard Annual rings distinctly marked by a narrow belt of numerous pores Pores small, in short, narrow, wavy tails of white tissue Medullary rays moderately broad

Outer Himalaya from the Sutlej to Bhutan in the North West Himalaya 6 000 ft to 10 000 ft in Darjeeling above 10 000 ft Western Ghats at high elevations Ceylon

Wood used for fuel the root in native medicine

H 80 Simla 7 000 ft

lbs  
53

H 2888 Nagkanda Simla 8 000 ft

H 3053 Mahasu Simla 8 000 ft

4 *B Lycium*, Royle, Hook Fl Ind 1 110, Brandis 12 Vern *Kasmal, Simla, Kashnal, chotra, Hind*

An erect rigid shrub Bark rough, corky, white or light grey Wood yellow, moderately hard Annual rings marked by a narrow porous belt Pores very small and extremely small, in narrow irregular lines of white tissue Medullary rays moderately broad, numerous

North-West Himalaya from 3,000 to 9,000 ft.

II 45.	Simla, 6,500 ft.	.	.	.	.	.	.	lbs.
II 3051.	Mahasu, Simla, 7,500 ft.	.	.	.	.	.	.	52

5. *B. coriacea*, nov. sp., Brandis. Vern. *Kashmal*, Simla.

A large erect thorny shrub, with soft corky bark. Wood yellow, moderately hard. Annual rings marked by a belt of small or moderately sized pores; in the rest of the wood the pores are very small or extremely small, and arranged in numerous confluent, irregularly shaped tails and patches of whitish tissue. Medullary rays short, fine to broad.

North-West Himalaya above 8,000 ft.; often forming alone or with other shrubs large extents of scrub jungle, *c. g.*, in the valley south of Nagkanda near Simla.

II 48.	Nagkanda, Simla, 9,000 ft.	.	.	.	.	.	.	lbs.
II 2894.	" " "	.	.	.	.	.	.	...
II 3039.	" " "	.	.	.	.	.	.	...
II 3011.	" " "	.	.	.	.	.	.	55
II 3013.	" " "	.	.	.	.	.	.	52
II 3038.	Matiyana, Simla, 8,000 ft.	.	.	.	.	.	.	...
II 3012.	Hattu, Simla, 10,000 ft.	.	.	.	.	.	.	...

6. *B. angulosa*, Wall.; Hook. Fl. Ind. i. 111; Gamble 5. Vern. *Chutra*, Nep.

A large erect shrub. Bark soft, brown, corky. Wood dark grey or yellowish brown, hard. Annual rings marked by a belt of small pores; in the rest of the wood the pores are very small, arranged in irregular radial tails of whitish tissue. Medullary rays fine, numerous.

Inner ranges of Nepal and Sikkim above 11,000 ft.

E 2862. Suburkum, Darjeeling, 11,000 ft.

## ORDER VII. CAPPARIDEÆ.

Six Indian genera are of trees, shrubs or climbers belonging all to one tribe, Cappareæ. The climbing genera are: *Marrua*, one species, *M. arenaria*, Hook. f. and Th.; Hook. Fl. Ind. i. 171 (*Capparis heteroclita*, Roxb. Fl. Ind. ii. 570). Vern. *Patta tiga*, Tel., a large woody climber of the Western Himalaya, Upper Gangetic plain and Central India; and *Roydsia*, two species, *R. suaveolens*, Roxb. Fl. Ind. ii. 643; Hook. Fl. Ind. i. 180; Gamble 5. Vern. *Kasonli*, Nep.; *Tunggor*, Lepcha, in the tropical forests of Sikkim, Bhutan and the Khasia Hills, and *R. obtusifolia*, Hook. f. and Th.; Kurz i. 67. Vern. *Ngaphyoo*, Burm., in the swamp forests of Burma. *Niebuhria linearis*, DC.; Hook. Fl. Ind. i. 171, is a small tree of the hilly parts of the Carnatic; and the species of *Cadaba* are small straggling shrubs chiefly of the arid zone, *C. indica*, Lamk. Vern. *Kali taka*, occurring in Berar and the Dekkan, and *C. heterotricha*, Stocks; Hook. Fl. Ind. ii. 173, being a small tree found in rocks near Cape Monze in Sind.

Wood light-coloured. Pores small to moderate-sized, rarely large; often arranged in radial lines; medullary rays moderately broad, wavy.

### 1. CAPPARIS, Linn.

A genus of about thirty species of thorny shrubs or climbers. About fifteen occur in Burma, ten in the Dekkan and Carnatic, five on the western coast, eight in Bengal and Assam, two in the Gangetic valley and Central India, and three in the arid zone of the Punjab and Sind. Besides those here described, there are several common species. *C. spinosa*, Linn.; Hook. Fl. Ind. i. 173; Brandis 14. Vern. *Kabawa*, Afg.; *Kabra*, Tibet; *Kaur*, *keri*, *kander*, *kakri*, *taker*, *ber*, *barari*, *bauri*, *bassar*, Pb.; *Ulla-kantu*, Kumaun;

*Kalāri*, Sind, is a small trailing shrub of the Punjab and Sind whose flower buds give the capers of commerce, they are pickled and eaten in Sind and the Punjab Salt Range. *C. diaricata*, Lamk., Hook Fl Ind 1 17 (*C. stylosa*, DC., Beddome xiii) Vern *Tbaratti*, Tam., *Budareni* Tel., *Pachunda*, Mar. is a shrub or small tree of the Dekkan and Carnatic with large scarlet fruit. *C. olacifolia* Hook f and Th., Hook Fl Ind 1 178, Gamble 5 Vern *Nashk hais* Nep., *Jhenok*, Lepcha, is a common thorny shrub of river banks and valleys in Northern Bengal and Assam. *C. horrida*, Linn., Hook Fl Ind 1 178, Brandis 15 (*C. zeylanica*, Roxb Fl Ind 11 567) Vern *His karula*, Pb., *Karralura*, Oudh., *Adonda*, Tel., *Katerni*, Gondī., *Gitoran*, Ajmere., *Atanday*, Tam. is a climbing shrub common in most parts of India.

1. *C. grandis*, Linn f., Hook Fl Ind 1 176, Beddome xiii, *C. disperma*, Roxb Fl. Ind 11 569 Vern *Guli, regguli, ragola*, Tel.

A small tree. Bark thick, extremely irregular, rough and corky, deeply and irregularly cracked. Wood white, moderately hard. No heartwood, no annual rings. Pores scanty, moderate-sized to large. Medullary rays moderately broad, short.

Chanda district and eastern part of the Dekkan. Eastern Ghats and Carnatic. Weight, 46 lbs. Wood durable. Much used by the natives in the Madras Presidency.

C 1134 Ahm Central Provinces

lbs  
46

2. *C. aphylla*, Roth, Hook Fl Ind 1 174, Beddome xiii, Brandis 14 Vern *Karil*, Pb., *Kiral*, Sind, *Kari*, Behar.

A small tree with scanty, small, caducous leaves, found only on the young shoots. Bark  $\frac{1}{2}$  inch thick, grey, corky, with deep irregular cracks. Wood light yellow, turning brown on exposure, shining very hard and close grained. Annual rings doubtful. Pores small, generally in groups or patches between the prominent, very short, numerous, fine medullary rays.

Punjab, Sind, Rajputana and the Dekkan.

Weight 53 lbs per cubic foot. The wood is used for small beams and rafters in roofs, for the knees of boats, for oilmills and agricultural implements, it is a good firewood, and is not eaten by white ants. The fruit is eaten both raw and preserved, and the young flower buds are preserved as pickle.

P 414	Ajmere	.	.	.	.	.	lbs
P 892	Multan	.	.	.	.	.	53
P 941	"	.	.	.	.	.	
P 3066	"	.	.	.	.	.	

## 2 CRATÆVA, Linn

1. *C. religiosa*, Forst., Hook Fl Ind 1 172, Beddome t 116 and xiv (*C. Nirala*, Ham.), Brandis 16, Gamble 5. *C. Roxburghii*, Ham., Kurz 1 66. *Capparis trifoliata*, Roxb Fl Ind 11 571 Vern *Brarna*, *bilasi*, *bila*, *biliana*, Hind., *Barun*, *ukto shah*, Beng., *Purbong*, Lepcha, *Maralingam*, *marvilanga*, Tam., *Ushia*, *usika*, *ulimidi*, *urumalti*, *tellavoolamara*, Tel., *Nirala*, Kan., Mal., *Kumli*, *karwan*, Mar., *Kadet*, *katat*, Burm.

A moderate-sized deciduous tree. Bark grey,  $\frac{1}{2}$  inch thick, with long horizontal wrinkles. Wood yellowish white, when old turning light brown. Pores moderate-sized, numerous, pore surrounded by 4-6 rays, fine and moderately broad, the distance between the rays slightly greater than the transverse diameter of the pores.

Sub-Himalayan tract from the Ravi eastwards, Bengal, Assam, Central and South India and Burma.

Weight, 42 lbs. The wood is used for drums, models, writing-boards, combs and in turnery.

P 3217.	Nagpahar, Ajmere	.	.	.	.	.	.	.	lbs.
O 270.	Garhwal (1868)	.	.	.	.	.	.	.	33
O 3112.	Dehra Dún	.	.	.	.	.	.	.	47
C 3115.	Chanda, Central Provinces	.	.	.	.	.	.	.	45
B 565.	Prome, Burma	.	.	.	.	.	.	.	43
No. 23.	Salem Collection	.	.	.	.	.	.	.	44

## ORDER VIII. VIOLACEÆ.

This order contains three genera of Indian plants: of these, two, *viz.*, *Viola* and *Ionidium*, are herbaceous; while the third, *Alsodeia*, comprises six shrubs or small trees found in Northern and Eastern Bengal, Burma and Malabar. *A. bengalensis*, Wall.; Hook. Fl. Ind. i. 186; Kurz i. 70; Gamble 6. Vern. *Kalipat*, Nep., occurs in Sikkim, Assam, Burma and the Andamans. *A. Roxburghii*, Wall.; Hook. Fl. Ind. i. 186; Kurz i. 69 (*Vareca heteroclita*, Roxb. Fl. Ind. i. 648), in Sylhet and the Andamans; and *A. racemosa*, Hook. f. and Th.; Hook. Fl. Ind. i. 187 (*A. longiracemosa*, Kurz i. 70), in Assam and Tenasserim, said by Kurz to have a yellowish white close-grained wood.

No. B 3198. (Home, 1874, No. 26, *Kyadoo*). A white scented wood from the Andamans, with scanty, moderately large pores; moderately fine, wavy, medullary rays, and numerous concentric lines of soft tissue, was identified by Kurz from Home's specimens as coming nearest to *Alsodeia* (Brandis' Memorandum on the Forest Resources of the Andamans, dated August 25th, 1874).

## ORDER IX. BIXINEÆ.

Seven genera belonging to three tribes:—

Tribe I.—Bixæ	.	.	.	.	<i>Cochlospermum</i> and <i>Bixa</i> .
„ II.—Flacourtia	.	.	.	.	<i>Scolopia</i> , <i>Flacourtia</i> and <i>Xylosma</i> .
„ III.—Pangia	.	.	.	.	<i>Gynocardia</i> and <i>Hydnocarpus</i> .

*Bixa Orellana*, Linn.; Roxb. Fl. Ind. ii. 581; Hook. Fl. Ind. i. 190; Beddome t. 79; Brandis 17; Kurz i. 72; Gamble 6. The Arnotto Plant. Vern. *Latkan*, Hind., Beng.; *Jarat*, Ass.; *Jafra*, Tel.; *Kuragumangjal*, Tam.; *Kuppa-manhala*, Kan.; *Kisri*, Mar.; *Theedin*, Burm., is an American shrub, introduced and cultivated in India for the red dye given by the pulp surrounding the seeds.

*Hydnocarpus* contains four Indian species. *H. heterophylla*, Bl.; Kurz i. 77. Vern. *Kal-lau-tso*, Burm., is described by Kurz as an evergreen tree with heavy, strong, yellowish white wood, found in the tropical forests of Burma. *H. castanea*, Hook. f. and Th.; Hook. Fl. Ind. i. 197; Kurz i. 79, is a tree of the Andaman Islands. *H. alpina*, Wight; Hook. Fl. Ind. i. 197; Beddome t. 77. Vern. *Maratatti*, Nilgiris, is a tree of the Western Ghâts, whose wood is said by Beddome to be used in the construction of native houses, for packing cases and firewood. *H. Wightiana*, Bl.; Hook. Fl. Ind. i. 196 (*H. Wightiana* and *H. inebrians*, Vahl.; Beddome xvi, xvii). Vern. *Yetti*, *maravetti*, Tam.; *Kouti*, Mar.; *Makulú*, Singh., is a common tree of the Western Ghâts and western coast.

The wood of *Flacourtia*, *Xylosma*, *Gynocardia* and *Scolopia* is uniform and remarkably similar to the wood of Euphorbiaceæ; it is hard and close-grained and the pores are small, in short radial lines between fine or very fine, closely packed medullary rays. The wood of *Cochlospermum* has an entirely different structure.

### 1. COCHLOSPERMUM, Kuntto.

1. *C. Gossypium*, DC.; Hook. Fl. Ind. i. 190; Beddome xiv;

Brandis 17, Kurz 1 72 *Bombax* - - - - -  
 Vern. *Kúmbi, gabdi, ganiár, galgal,*  
*Gungú, kong, kandu gogu, Tel, Tanak*  
 Mal, *Ganeri, Bhíl, Ganeri, gunglay, Mar.*

A small deciduous tree, with short, thick, spreading branches. Bark one inch thick, deeply furrowed, inner substance red. Wood extremely soft, grey, no heartwood. Pores large, scanty, often subdivided into compartments. Medullary rays broad, on a radial section, visible as long rough plates.

Forests at the base of the North West Himalaya, from the Sutlej eastwards,  
 e gum (*Katira*),

C 1141 Ahiri Reserve, C P . . . . . lbs  
 17

## 2. SCOLOPIA, Schreber

Three species *S. crenata* Clos, Hook Fl Ind 1 191, Beddome t 78 (*Phoberos crenatus*, W and A Prodr 29) Vern *Hitterlu* Burghers is a tree of Malabar, Kanara and Mysore, said by Beddome to have a hard dense, white wood, liable to warp *S. Roxburghii*, Clos, Hook Fl Ind 1 190, Kurz 1 73 (*Ludia spinosa*, Roxb Fl Ind 1 507), is an evergreen tree of Tenasserim the stem and older branches of which are armed with long straight or compound spines.

1. *S. rhinantha*, Clos, Hook Fl Ind 1 190 B 1969, collected by Kurz in the Andamans in 1866, bears this name. It has a hard red wood, with a structure similar to that of *Flacourtia*, the pores being small, in short radial lines, between the very fine and closely packed medullary rays. Weight 60 lbs per cubic foot.

## 3 FLACOURTIA, Commerson

Seven Indian species. The following are the names given in the Flora Indica 1, 191 to 194 —

1. *F. sumatrana* Planch, Kurz 1 74 Tenasserim
2. *F. inermis* Roxb Fl Ind 1 833, Beddome Sylhet, S India, Martaban  
     xvi Kurz 1 74 Vern *Tomilom*, Mal,  
     *Ubbolu*, Kan Perhaps introduced Fruit  
     edible
3. *F. montana*, Grah, Beddome xvi Vern *Attak*, Western Coast  
     Kan Mar
4. *F. mollis*, Hook f and Th, Kurz 1 74 Tenasserim
5. *F. Cataphracta* Roxb Fl Ind 1 834, Bed- Bengal, Burma, Bombay,  
     dome xvi, Kurz 1 74 Vern *Paniala*,  
     *panizali* Beng, *Talispatri, pansala*,  
     Hind, *Talisapatri*, Tam, Tel, *Ayuwa*,  
     Burm
6. *F. Ramontchi*, L'Herit . . . India.
7. *F. sepriaria*, Roxb Fl Ind 1 835 (also *F.* Kumaun, Bengal and South  
     *obcordata*), Beddome xvi, Brandis India  
     18, Kurz 1 75 (also *F. rotundifolia*)  
     Vern *Sharawani, daykar, jidkar*, Hind,  
     Kanru, Tel.

1 *F. Ramontchi*, L'Herit, Hook Fl Ind 1 193, Beddome xvi,  
 Brandis 18 *F. sapida*, Roxb Fl Ind 1 835, Kurz 1 75. Vern.  
*Kukai, laloo, langú, landei, Pb, Bilangra, bhanber, langú, landi*



*kallár, kalli*, Hind.; *Kaikun*, Mhairwarra; *Kánk, kánki, biláti*, C. P.; *Arma-suri, katicn*, Gondí; *Gurgoti*, Kurku; *Bíncha, katái*, Beng.; *Bonicha*, Uriya; *Pahar, bhekal, kakei, kaker*, Mar.; *Bhutankas*, Hyderabad; *Kanregu, pedda-kanru, kaka, nakka-naregu*, Tel.; *Úgúrassa*, Singh.; *Na-yuwai*, Burm.

A small thorny deciduous tree. Bark grey. Wood red, hard, close and even-grained, splits, but does not warp and is durable. Pores small, in radial lines between the fine, uniform, closely-packed and somewhat wavy medullary rays.

Dry hills throughout India, Prome District in Burma.

Weight: Brandis gives 50 lbs. per cubic foot, the average of our specimens is 53 lbs. The wood is used for turning and agricultural implements, and the fruit and leaves are eaten.

P 460.	Ajmere . . . . .	lbs.
P 3221.	Nagpahar, Ajmere . . . . .	52
O 260.	Garhwal (1868) . . . . .	...
C 2739.	Moharli Reserve, C. P. . . . .	50
B 3125.	Burma (1862) . . . . .	52
		59

#### 4. XYLOSMA, Forster.

Three species. *X. controversum*, Clos.; Hook. Fl. Ind. i. 194, is a tree of Nepal and the Khasia Hills, nearly allied to *X. longifolium*. *X. latifolium*, Hook. f. and Th.; Hook. Fl. Ind. i. 194, is a large thorny tree of the Bababuden Hills in Mysore.

1. *X. longifolium*, Clos.; Hook. Fl. Ind. i. 194; Brandis 19. Vern. *Chopra, chirúnda, chirudi, drendu*, Pb.; *Kattáwa*, Oudh; *Dandál, katári, kandhára*, Hind.

A small evergreen tree. Bark  $\frac{1}{8}$  inch thick, grey. Wood pinkish, moderately hard, even-grained. Pores small, in short radial lines between the wavy, very fine and closely-packed medullary rays.

North-West Himalaya ascending to 5,000 feet, Assam.

Weight, 55 lbs. per cubic foot. The wood is used for fuel and charcoal.

H 2947.	Jander, Sutlej Valley, 3,500 feet . . . . .	lbs.
		55

#### 5. GYNOCARDIA, R. Br.

1. *G. odorata*, R. Br.; Hook. Fl. Ind. i. 195; Kurz i. 76; Gamble 6. *Chaulmoogra odorata*, Roxb. Fl. Ind. iii. 835. Vern. *Chaulmúgrí, petarkura*, Beng.; *Kadu*, Nep.; *Túk*, Lepcha; *Toungpung*, Magh.

A moderate-sized evergreen tree, readily known by the hard, round fruits which grow on the stem and main branches. Bark  $\frac{1}{4}$  inch thick, grey, smooth. Wood hard, close-grained, yellow or light brown. Pores very small, in radial lines between the white, very numerous and prominent medullary rays.

Northern and Eastern Bengal and Assam, Chittagong and Burma.

Weight, 47 lbs. per cubic foot.

The wood is used in Chittagong for planking and for posts, and the pulp of the fruit in Sikkim to poison fish. The seeds give by expression a thick oil, used in the treatment of cutaneous diseases, especially leprosy.

E 708.	Chittagong . . . . .	lbs.
		47

## ORDER X. PITTOSPOREÆ.

An order containing one genus of Indian trees or shrubs, the remaining genera

*Prongzam*, Lepcha, is a common small tree of the outer Himalaya from the Jumna to Bhutan ascending to 8,000 feet, the Khasia Hills and Western Ghâts.

## ORDER XI. POLYGALEÆ.

*cus arillata*,  
of Northern  
Kurz 1 79),  
08 (*S. inap*-  
tern Bengal,  
*flavescens*,  
according to

evergreen trees of Burma.

## ORDER XII. TAMARISCINEÆ.

A small order containing bushes or small trees with small sessile or scale like sheathing leaves two genera, *Tamarix* and *Myricaria*

Wood white or reddish, sometimes darker in the centre, but no heart-wood. Pores small to moderate-sized, often in groups, more numerous and large in the spring wood wherever the annual rings are distinct. Medullary rays generally moderately broad to broad, short, distant.

## 1. TAMARIX, Linn.

Bushes or small trees, with scale like leaves and white or pink flowers, chiefly found on the banks of streams and on the lowlands near rivers. There are six species, of which the most important are *T. articulata*, Vahl, *T. dioica*, Roxb., and *T. gallica*,

*Linn. Hook. Fl. Ind. 1. 249. Beddome xv. Brandis 21. Kurz. 1. 83. Gamble 6. Vern. Lei, pilchi, loan, kachlei, Pb; Gaz, lao, jan, Sind; Laljhan, Beng.; Jan, Hind*

*gallica*.  
1. *T. dioica*, Roxb. Fl. Ind. n. 101; Hook. Fl. Ind. 1. 249, Beddome xv; Brandis 21; Kurz. 1. 83, Gamble 6; Vern. *Lei, pilchi, loan, kachlei*, Pb; *Gaz, lao, jan*, Sind; *Laljhan*, Beng.; *Jan*, Hind  
A gregarious shrub. Bark grey with reticulate cracks, shewing the red inner bark. Wood moderately hard, red, outer portion white. Pores small to moderate-sized, in groups or short radial lines, more abundant and larger in the spring wood. Medullary rays very promi-



## ORDER XIII. HYPERICINEÆ.

A small order with three Indian genera. One, *Ascyrum*, contains only one small plant from Sikkim. *Hypericum*, a number of herbs and small shrubs of the Himalaya, the most common of which are *H. cernuum*, Roxb Fl Ind iii 400, Hook Fl Ind i 253, a handsome small shrub with large bright yellow flowers, found in the Western Himalaya especially on rocks, and *H. Hookerianum*, W and A, Hook Fl Ind i 251, Gamble 6. Vern *Tumbomri*, Lepcha (E 2861, Darjeeling, 7,000 ft (43 lbs)) a

## 1. CRATOXYLON, Bl.

A genus of five trees from Burma and the Andaman Islands containing besides the one described, *C. formosum*, Bth and Hook f, from the Andamans, and *C. pruniflorum*, Kurz, *C. polyanthum*, Korth, and *C. arborescens*, Bl, from Martaban and Tenasserim

*I. C. neriifolium*, Kurz i. 85.; Hook. Fl. Ind. i. 257. Vern. *Baibya*, Burm.

A tree. Bark dark coloured, rough. Wood dark grey, hard, close-grained. Pores large, in short narrow wavy irregular patches of softer tissue. Medullary rays not prominent, fine, numerous, on a radial section visible as dark narrow plates.

Chittagong and Barma

Weight, 47 lbs per cub ft. According to Kurz, the wood is used for building purposes, for ploughs, handles of chisels, hammers and other implements

B 312	Burma (1867)	lbs
		47

## ORDER XIV. GUTTIFERÆ

An order of tropical trees, containing six genera, belonging to two tribes, viz —

Tribe I —	Garcinieæ	<i>Garcinia</i> and <i>Ochrocarpus</i>
„ II —	Calophylleæ	<i>Calophyllum</i> , <i>Kayea</i> , <i>Mesua</i> and

Of *Ochrocarpus*, there are three species

Fl Ind i 270, Beddome t 89 Vern

Mal „ *Wandi*, *taringi* (♂), *poone* (♀), *suringi*, *yaraunai* (♀), *han*, is a large,

but referred to this  
Beddome t 3 Vern.  
from South Kanara  
hard wood used for  
it is a large tree of

the Ghats of Tinnevely and Travancore with a valuable, hard, reddish timber, used for building, and to make walking sticks

genera : species of *Garcinia*,  
rays : in size. Medullary  
across the rays. bands of soft texture

## 1. GARCINIA, Linn.

A large genus of evergreen, opposite leaved trees, usually with a yellow juice,

generally giving a more or less pure description of gamboge. They chiefly come from the tropical regions of India, none of them extending to Northern and Central India, and only one or two as far as Northern Bengal. There are about 22 Indian species, the synonymy of which is somewhat confused.

The following is Dr. T. Anderson's list, given at pages 259 to 270 of Hooker's *Flora Indica*, Kurz's species being added in brackets :—

## SECTION I.—GARCINIA.

1. *G. Mangostana*, Linn.; Roxb. *Fl. Ind.* ii. 618; Cultivated in South Te-  
Kurz i. 87. The Mangosteen. Vern. nasserim.  
*Mengkop*, *youngzalai*, Burm. In  
Helfer's "Report on the Provinces of Ye,  
Tavoy and Mergui" of 1839, he says  
that "a full-grown tree yields 1,000  
fruits, which at the lowest can be  
reckoned at Rs. 3 per 100," and that  
"the integument of the fruit yields a  
very strong and valuable tan."
2. *G. cornea*, Linn.; Roxb. *Fl. Ind.* ii. 629; Kurz Eastern Bengal and  
i. 88. Burma.  
"Wood brown, heavy; gives an inferior kind of  
gamboge."—Kurz.
3. *G. speciosa*, Wall. . . . . Tenasserim and Anda-  
mans.
4. *G. indica*, Choisy (*G. purpurea*, Roxb. *Fl. Ind.* ii. 624; Beddome xxi). *Brindall*, Goa. Ghâts of Concan and  
Kanara.  
"The fruit has an agreeable, acid flavour, a  
syrup is made from it; the seeds furnish  
a concrete oil called *Kokum* in Bom-  
bay."
5. *G. Cambogia*, Desrouss. . . . . Western Ghâts.
6. *G. Cowa*, Roxb. . . . . Assam, Bengal, Burma  
and Andamans.
7. *G. lanceafolia*, Roxb. *Fl. Ind.* ii. 623; Kurz i. 91. Assam, Sylhet and Chit-  
(*G. purpurea* Wall.) Vern. *Kirindur*, tagong.  
Sylhet.
8. *G. loniceroides*, T. And. (*G. succifolia*, Kurz Swamp forests in Pegu.  
i. 91).  
"Wood white, perishable; yields little and  
inferior gamboge."—Kurz.
9. *G. pedunculata*, Roxb. *Fl. Ind.* ii. 625; Gamble Rangpur, Goalpara and  
7. Vern. *Tikil*, *tikur*, Beng.; *Borthekra*, Sylhet.  
Ass.; cultivated for its fruit.  
"Wood used for planks, beams, and ordinary  
building."—Mann.
10. *G. Morella*, Desrouss. . . . . Assam. Eastern Bengal,  
South India.
11. *G. heterandra*, Wall. (*G. elliptica*, Wall.; Kurz Hills of Burma up to  
i. 49). Vern. *Thanat-tau*, Burm. 3,000 feet.  
"Wood soft, white; yields a superior quality  
of gamboge."—Kurz.
12. *G. Wightii*, T. And. . . . . South India.  
"The gamboge of this species is very soluble  
and yields a good pigment."—T. And.
13. *G. paniculata*, Roxb. *Fl. Ind.* ii. 626; Kurz i. Eastern Himalaya, Kha-  
92. Vern. *Bûbi-kowa*, Sylhet. sia Hills, Sylhet and  
Chittagong.
14. *G. atro-viridis*, Griff. . . . . Upper Assam.
15. *G. anomala*, Pl. and Trian.; Kurz i. 89. Vern. Khasia Hills, and hills of  
*Usaqueng*, Ass. Martaban, 3,000 to  
6,000 feet.

## SECTION I.—GARCINIA—continued.

16. *G. stipulata*, T. And.; Gamble 7. Vern. *Sana-kadan*, Lepcha. Sikkim and Bhutan, up to 4,000 feet.  
 "Fruit yellow, sometimes eaten by Lepchas; the tree and fruit give a yellow gum, but it does not seem to be used."—*Gamble*.
17. *G. merguensis*, Wight; Kurz i. 89 . . . Tenasserim.
18. *G. travancorica*, Beddome t. 173 (*G. sp. 2*. Forests of Travancore and Tinnevely.  
 Beddome xxi). Vern. *Malampongu*, Tinnevely.  
 "Every portion of the tree yields an abundance of bright yellow gamboge, not yet examined."—*Beddome*.
19. (*G. microstigma*, Kurz i. 91) . . . Andamans.

## SECTION II.—XANTHOCHYMUS.

20. *G. Xanthochymus*, Hook. f.; Kurz i. 93. *Xanthochymus pictorius*, Roxb. Fl. Ind. ii. Eastern Himalaya, Eastern Bengal, Burma, South India.  
 \* 633; Beddome t. 88. Vern. *Tepor*, Ass.; *Maohla*, Phekial; *Dampel*, Hind.; *Iwara memadi*, *tamalamu*, *chitakamraku*, Tel.; *Mataw*, Burm.  
 "Yields a large quantity of indifferent gamboge."—*Roxburgh*.
21. *G. ovalifolia* Hook. f. & *G. ovalifolia* Benth. Western Ghâts.
22. *G. dulci* . . . Andamans.

IND. II. 551j.

Wood close-grained, hard. Pores small to large, subdivided. Numerous concentric bands of softer texture. The structure of the wood of the species of *Garcinia* is not uniform. *G. Cowa* and *G. Morella* have similar wood, while *G. speciosa* differs by having fine medullary rays and *G. Cambogia* by the absence of distinct concentric rings. The structure of the *Garcinias* requires further investigation.

1. *G. speciosa*, Wall.; Hook. Fl. Ind. i. 260; Kurz i. 88. Vern. *Palawa*, Burm.

An evergreen tree. Bark thin, greyish-black. Heartwood red, very hard, cross-, and close-grained. Pores small, very numerous. Numerous short, wavy, transverse bands joining the pores. Medullary rays very fine, uniform, equidistant, not very distinct, the distance between two rays about equal to the transverse diameter of the pores.

Tenasserim and the Andaman Islands.

Weight, according to Major Protheroe, 72 lbs.; our specimens give only 52 lbs. and Wallich (Nos. 73, 74, *Garcinia sp.*, *Pullowa*) 45½ lbs.

Used for house and bridge posts, and other purposes; said to be used by the Andamanese to make bows.

B 501.	Andaman Islands	lbs.
B 2192.	Do. (Home, 1874, No. 18)	52
		52

Two specimens marked B 2193 *Pantagak*, No. 20. (51 lbs.), and B 2500 *Phungnyet*, No. 19 (62 lbs.), brought by Home from the Andamans in 1874 resemble *G. speciosa*, but the pores are in short radial lines and the medullary rays more distinct.

B 2203 (47 lbs.), received from the Andamans in 1866 under the name of *Thinganee* is similar in structure to B 2193 and 2500, but the pores are larger.

2. *G. Cambogia*, Desr.; Hook. Fl. Ind. i. 261; Beddome t. 85; Roxb. Fl. Ind. ii. 621. Vern. *Aradal*, Kan.; *Heela*, Burghers.

A small evergreen tree. Wood grey, cross-grained, shining, hard. Pores small and very small, in short radial lines, between the closely packed, uniform, very fine medullary rays. Concentric bands present, but indistinct.

Western Coast and Ceylon.

Weight, 54 lbs. per cubic foot. Beddome says the wood would answer for common furniture.

Thwaites states that this tree yields a yellow insoluble gum, which is consequently valueless as a pigment. It is, however, said to be soluble in spirits of turpentine, and to form a beautiful yellow varnish. Mr. Cherry says it gives an oil which is used in medicine.

W 845.	South Kanara	.	.	.	.	.	.	.	lbs.
									54

3. *G. Cowa*, Roxb. Fl. Ind. ii. 622; Hook. Fl. Ind. i. 262; *G. Cowa* and *G. Kydia*, Roxb.; Kurz i. 90. Vern. *Cowa*, Hind.; *Toungthalay*, Burm.

A tall evergreen tree with round stem and dark grey bark. Wood greyish-white, moderately hard. Pores moderate-sized to large, scanty, often subdivided. Medullary rays fine to broad. Numerous, wavy, concentric bands of soft tissue across the rays.

Eastern Bengal, Assam, Chittagong, Burma and the Andaman Islands.

Weight, 42 lbs. per cubic foot (Brandis 1862, No. 19); our specimens give an average of 40 lbs. Kyd gives weight 47 lbs.,  $P=815$ . Wood not used. Is said to give a kind of gamboge of a rather different colour to that produced by *G. Morella*.

B 549.	Martaban.	.	:	:	:	:	:	:	lbs.
B 3148.	Burma (1862)	.	:	:	:	:	:	:	43
									37

4. *G. Morella*, Desrouss.; Hook. Fl. Ind. i. 264; Thwaites Enum. 49; Beddome t. 86. *G. pictoria*, Roxb. Fl. Ind. ii. 627; Beddome t. 87. *G. Gutta*, Wight. The Gamboge Tree. Vern. *Aradal*, *punar puli*, Kan.; *Gokatrú*, *kana-goraka*, Cingh. (The gum resin, *Gota gamba*, Hind.; *Makki*, Tam.; *Revachinni*, Mar.; *Sanatosi*, Burm.; *Gokatu*, Cingh.)

An evergreen tree. Wood yellow, hard, mottled. Pores large, subdivided. Medullary rays moderately broad. Numerous, wavy, concentric bands of soft texture across the rays which are narrower than in *G. Cowa*.

Forests of the Khasia Hills, Eastern Bengal, Western Coast, and Ceylon.

The tree which produces the true gamboge. The gum is, however, not collected in the forests of South India, and the chief trade supply is obtained from Siam. In Ceylon it is usually collected by cutting a thin slice off the bark of the tree here and there of the size of the palm of the hand. On the flat space thus exposed the gum collects and is scraped off when sufficiently dried.

No. 14,	Ceylon collection (marked <i>Cambogia Gutta</i> , Vern. <i>Cocatiye</i> )	,	lbs.
			56

## 2. CALOPHYLLUM, Linn.

A large genus of chiefly tropical trees, of which many species occur in the Malay Peninsula and Ceylon. Six species occur in India, of which four in Burma and the Andamans, three in Southern India and one in Northern and Eastern Bengal. Five species are herein described, and the remaining species is *C. retusum*, Wall.; Hook. Fl. Ind. i. 272 (*C. amaranum*, Wall.; Kurz i. 95), an evergreen tree of Tenasserim. The genus is remarkable for its handsome flowers and beautiful parallel-veined, opposite, coriaceous leaves.

Wood soft and moderately hard, reddish, with a darker coloured heartwood, seasons well, weight moderate. Pores moderate-sized or large, prominent on a vertical section, often arranged in wavy strings or groups. Medullary rays fine or very fine, indistinct on a cross section but prominent as straight narrow lines on a radial section. Interrupted concentric lines of soft tissue.

1. *C. spectabile*, Willd., Hook. Fl. Ind. i. 271, Kurz i. 91; *C. Moonii*, Wight, Beddome xxii., *C. amœnum*, Wall. in Exhibition Catalogue; *C. tetrapetalum*, Roxb. Fl. Ind. ii. 608. Vern. *Panta-la*, Hind. (from Andamans) cross-grained, moderate-wavy lines prominent, very numerous, prominent on a radial section as long, straight, dark-coloured narrow plates. Concentric lines of soft tissue divide the wood into what at first sight appear to be annual rings, but on closer examination are found to be interrupted, and cannot be held to be the lines which mark the annual increment, these lines are visible on a vertical section.

Tenasserim and Andaman Islands

Weight, 38.39 lbs. per cubic foot. No. 13, from the Andaman Islands, of Brandis' experiments of 1866 is probably this. Weight, 39.5 lbs.  $P=530$ —mean of 8 experiments with bars  $2' \times 1' \times 1'$

The wood is used for masts and spars, also for planking for which purpose it has lately been used in building barracks in the Andamans

B 525	Andaman Islands	lbs.
B 1992	" " (Kurz, 1866)	39
B 3197.	" " (Home, 1874, No. 14, <i>Teem</i> )	38
		39

2. *C. inophyllum*, Linn., Hook. Fl. Ind. i. 273, Beddome xxii., Kurz i. 95, Roxb. Fl. Ind. ii. 606. The Alexandrian Laurel. Vern. *Sullana champā*, Hind., Beng., *Pinnay*, Tamil, *Pūna*, *pūnās*, Tel., *Wūma*, Kan., *Undi*, Mar.; *Domba*, Cingh.; *Pongnyet*, Burm., *Bintangor*, Malay.

An evergreen tree. Bark grey or blackish-brown, smooth. Wood reddish-brown, moderately hard, close-grained. Pores small and moderate-sized, arranged in groups. Medullary rays extremely fine and numerous. Numerous, not very prominent, interrupted concentric lines of soft tissue.

South India, Burma and Andaman Islands, often cultivated for ornament in other parts of India

the specimens received averaged  
"Used for masts, spars, railway

W 733	South Kanara	lbs.
B 2257	Andaman Islands (1866)	38
B 2258	" " "	45
B 2263	" " "	44
		26

3. *C. polyanthum*, Wall., Hook. Fl. Ind. i. 274; Kurz i. 95; Gamble 7. Vern. *Kandeb*, Beng., *Kironli*, Nep., *Sunglyer*, Lepcha. An evergreen tree. Structure the same as that of *C. spectabile*.

Northern and Eastern Bengal, Khasia Hills, Chittagong and Burma, ascending to 5,000 feet



Weight, 40 lbs. per cubic foot. Mr. Chester says it is used largely in Chittagong for masts, spars and rafters, and sometimes for small boat building and canoes.

E 1400.	Chittagong	.	.	.	.	.	.	lbs.
E 2490.	Chenga Forest, Darjeeling Terai	.	.	.	.	.	.	44
E 2953.	Chunbati, Darjeeling, 3,000 feet	.	.	.	.	.	.	38
		.	.	.	.	.	.	39

These last two have the same structure as *C. polyanthum*, but the wood has a dark red colour.

4. *C. tomentosum*, Wight; Hook. Fl. Ind. i. 274; Beddome xxii. *C. elatum*, Beddome t. 2. The Poon Spar Tree. Vern. *Poon*, *poone*, Mal.; *Pongoo*, Tamil; *Siri poone*, Kan.

A large, tall, evergreen tree. Bark with numerous longitudinal cracks. Structure the same as that of *C. spectabile*.

Evergreen forests of the Western Coast from Kanara southwards.

Weight: Couch's experiments at Plymouth Dockyard gave 36 to 43 lbs. per cubic foot; our specimens give 35 lbs. per cubic foot. Yields the Poon spars of commerce, good spars often fetching large prices. It is also used for building and bridge work. The seeds give an oil.

W 762.	South Kanara	.	.	.	.	.	.	lbs.
D 1279.	Anamalai Hills	.	.	.	.	.	.	32
		.	.	.	.	.	.	38

5. *C. Wightianum*, Wall.; Hook. Fl. Ind. i. 274; Beddome t. 90. *C. decipiens*, Wight Ic. 106. Vern. *Kalpoon*, *kull-ponné*, Kan.; *Cheru pinnay*, Tam.

An evergreen tree. Wood hard, red. Pores large and moderate-sized, uniformly distributed. Medullary rays very fine, not very distinct. Numerous interrupted, wavy and anastomosing concentric bands of soft tissue.

Western Ghâts from the Konkan to Travancore.

Weight, 45 lbs. per cubic foot. It is probably No. 36 of Skinner's List (*C. spurium*) W = 39 lbs.; P = 567. Beddome says the timber is much esteemed and valuable for engineering purposes.

W 861.	South Kanara	.	.	.	.	.	.	lbs.
		.	.	.	.	.	.	45

### 3. KAYEA, Wall.

Two Indian and one Ceylon species. *K. floribunda*, Wall.; Hook. Fl. Ind. i. 276; Kurz i. 96. Vern. *Karram-jowa*, Sylhet, is a tree of the tropical forests of the Eastern Himalaya and of the hills of Martaban, ascending to 3,000 feet. *K. nervosa*, T. And.; Hook. Fl. Ind. i. 277; Kurz i. 97 is an evergreen tree of Tenasserim.

1. *K. stylosa*, Thwaites Enum. 50; Hook. Fl. Ind. i. 276; Beddome t. 102. Vern. *Suvanda*, Cingh.

A large tree. Bark dark grey. Wood soft, reddish. Pores moderate-sized, numerous. Medullary rays very fine, indistinct, with concentric bands of soft texture across the rays.

A. Mendis gives the weight at 56 lbs. and P = 814.

Ceylon, south of the island.	No. 82, Ceylon collection	.	.	.	.	lbs.
		.	.	.	.	56

### 4. MESUA, Linn.

Beddome gives six species of this genus, but all these are included in the *Flora Indica* by Dr. T. Anderson under one, *Mesua ferrea*. In the "Genera Plantarum" there are said to be three species. These include *M. Thwaitesii*, Pl. and Trian., of Ceylon, and a species from Malacca.

1. *M. ferrea*, Linn, Hook Fl Ind 1 277, Roxb Fl Ind 11 605, Kurz 1 97, Beddome xxiii (with also *M speciosa*, Choisy, *M Roxburghii*, Wight, *M sclerophylla*, Thw, *M pulchella*, Pl and Thun, and *M coromandeliana*, Wight, Beddome t 64), Thwaites Enum 50 Vern *Nagesar*, Beng, *Nakor*, Ass, *Nageshvaro*, Uriya, *Nangal*, *malloy nangal*, Tim, *Naga kesara*, Tel, *Nang*, Tinnevely, *Naga sampigi*, Kan, *Nag champa*, Mar, *Behetta champagam*, Mal, *Na, deya ná*, Cingh, *Kaing go*, Magh, *Gangau*, Burm

A large evergreen tree Heartwood dark red, extremely hard Poies moderate sized, often in groups, scanty, often filled with yellow resin Medullary rays extremely fine, uniform, equidistant, very numerous. Numerous fine, wavy, concentric lines of light-coloured tissue

Eastern Bengal from the Monas eastward (though traces of its having formerly been found west of that river occur sometimes in the names of places *e g* *Nageshwarbari* or *Naksarbari* a town in the Sikkim Terai on the Nepal frontier), Assam South India Ceylon Burma and the Andamans often cultivated

The weight and transverse strength have been determined by the following experiments —

		Weight	Value of P
A Mendis	Ceylon No 59 with bars 2 × 1' × 1" sound	72 lbs.	994
Brandis	Burma No 18 1863	69 "	
Bennett	Andamans No 4 1872	70 "	1053
Smythies	{ Assam (4 specimens) 1878	67 5 ,	
	{ Kanara (1 " )	62 ,	
	{ Burma (6 " )	70 ,	

Several of our specimens however reached 74 to 76 lbs per cubic foot in weight It is very durable It has been found to answer for sleepers equally well with

but its more general use is prevented by its great hardness weight and the difficulty of working it In Ceylon an oil is obtained from the nut and the tree is often planted for the sake of its handsome flowers

		lbs
E 2309	E Duars Assam	64
E 733	Kamrup "	61
E 2190	Nowgong "	75
E 1273	Cachar "	70
W 741	South Kanara	62
B 2504	Burma (1862)	69
B 551	Martaban	75
B 2700	Tavoy (Wall ch 1823)	60
B 2238	Andamans (Mayoi Ford 1866)	70
B 2491	(Home, 1874, No 10)	67
B 520		74
No 59	Ceylon Collection ( <i>Mesua Nagaha</i> )	72

## ORDER XV TERNSTROMIACEÆ

Twelve genera belonging to three tribes —

Tribe I — Ternstromiæ	<i>Anneslea</i> , <i>Ternstroemia</i> , <i>Adinandra</i> , <i>Cleyera</i> and <i>Eurya</i>
" II — Sauraujæ	<i>Actinidia</i> , <i>Saurauja</i> and <i>Stackyus</i>
" III — Gordonieæ	<i>Pyrenaria</i> , <i>Shima</i> , <i>Gordonia</i> and <i>Camellia</i>

*Anneslea* contains two small trees of Burma: *A. fragrans*, Wall.; Hook. Fl. Ind. i. 280; Kurz i. 98, of the Eng forests, and *A. monticola*, Kurz i. 98, of the hill forests of Martaban at 5,000 to 7,000 feet. *Ternstroemia*, two trees of South India and Burma: *T. japonica*, Thunb.; Hook. Fl. Ind. i. 280; Kurz i. 99 (*T. gymnanthera*, Beddome t. 91). Vern. *Kaymonc*, Nilgiris, an evergreen tree of the Western Ghâts and the Martaban Hills, said by Beddome to have a pinkish wood, used for house-building; and *T. penangiana*, Choisy; Hook. Fl. Ind. i. 281; Kurz i. 99, an evergreen tree of the Andamans and Tenasserim. *Adinandra villosa*, Choisy; Hook. Fl. Ind. i. 283; Kurz i. 100, is an evergreen tree of Pegu. *Cleyera ochracea*, DC., and *C. grandiflora*, Hook. f. and Th.; Hook. Fl. Ind. 283, 281, are small trees of the North-Eastern Himalaya and Khasia Hills. *Actinidia* contains two climbing shrubs: *A. callosa*, Ldl. (No. E. 2858, Takdah Forest, Darjeeling, 5,000 feet, with corky bark and brown, very porous wood) at about 5,000 feet, from Garhwal to Bhutan and the Khasia Hills, and *A. strigosa*, Hook. f. and Th., of the Sikkim Himalaya, at 6,000 to 8,000 feet: both, Hook. Fl. Ind. i. 286; Gamble 8. Vern. *Typhal*, Nep.; *Taksing*, Lepcha. Fruit edible, of good flavour. *Stachyurus himalaicus*, Hook. f. and Th.; Hook. Fl. Ind. i. 288, is a small glabrous tree of the Eastern Himalaya from 5,000 to 8,000 feet.

In *Pyrenaria* are four evergreen trees: three of which, *P. attenuata*, Seem.; Hook. Fl. Ind. i. 290 (*P. serrata*, Bl.; Kurz i. 105) of Tavoy; *P. diospyricarpa*, Kurz i. 101, and *P. camelliaeflora*, Kurz i. 105, of the Martaban Hills, are Burmese; and one, *P. barringtoniaefolia*, Seem.; Hook. Fl. Ind. i. 290, of the Gáro Hills in Assam. *Gordonia obtusa*, Wall.; Hook. Fl. Ind. i. 291; Beddome t. 83. Vern. *Nagetta*, Nilgiris, is a tall grey-barked tree of the Western Ghâts, said by Beddome to have a yellowish-white, even-grained wood, used for house-building, but liable to warp. *G. excelsa*, Bl.; Hook. Fl. Ind. i. 291, is a tree of the Bhutan Himalaya.

Pores small, uniformly distributed between the fine or very fine medullary rays. The species of *Eurya* have a few broader rays alternating with the fine rays.

## 1. EURYA, Thunb.

A genus of evergreen shrubs or small trees, of the Eastern Himalaya, Assam, Southern India, and Burma. *E. japonica*, Thunb.; Hook. Fl. Ind. i. 284; Beddome t. 92; Brandis 24; Kurz i. 101; Gamble 7. Vern. *Baurra, gonta, deura*, Hind.; *Jhingni*, Nep.; *Tungchong*, Lepcha; *Hoolooni*, Nilgiris; *Toungletpet*, Burm., is found in the Himalaya from the Jumna eastwards, above 3,000 feet in altitude, in the Western Ghâts and in Burma. It grows quickly and often gregariously in the Sikkim hills, and coppices well. *E. trichocarpa*, Korth, is a small tree of Bhutan and the Khasia Hills.

1. *E. symplocina*, Bl.; Hook. Fl. Ind. i. 284; Kurz i. 102; Gamble 7. Vern. *Bara jhingni, kisi*, Nep.; *Plotungchong*, Lepcha.

A small evergreen tree. Bark brown, thin. Wood reddish-white, soft, close-grained. Annual rings marked by more numerous pores in the spring wood. Pores very small. Medullary rays very fine and moderately broad, the latter short, prominent.

Hills of the North-Eastern Himalaya, from 5,000 to 7,000 feet, Burma.

Weight, 38 lbs. per cubic foot. Used only for firewood.

E 385.	} Rangbúl, Darjeeling, 7,000 feet . . . . .	: {	lbs.
E 2319.			35
			42

2. *E. acuminata*, DC.; Hook. Fl. Ind. i. 285; Kurz i. 101; Gamble 7. Vern. *Sanu jhingni*, Nep.; *Plotungchong*, Lepcha.

A small evergreen tree. Bark brown, thin, smooth. Wood differs from that of *E. symplocina* in having the larger medullary rays less broad and less prominent.

Hills of the North-Eastern Himalaya, Assam and Martaban, from 5,000 to 8,000 feet.

Weight according to Kyd 32 lbs, our specimen however weighed 47 lbs  
 Hyd's experiments on a bar  $2 \times 1 \times 1$  gave  $P = 337$  for wood from Goalpara

E 2320 Pangbul Darjeeling 7500 ft

lbs  
47

## 2 SAURAUJA, Willd

A genus of trees or shrubs with handsome parallel veined generally scaly and rusty tomentose leaves and pink or white flowers. Of the eight Indian species five are found in Burma and six in the Eastern Himalaya. Besides the species here described

*S. Griffithii* Dyer Hook Fl Ind 1 286 Gamble 8 Vern *Gogen* Nep *Hlosipha*,  
*Lepcha* is an extremely hard

densely yellow tomentose beneath

Hook Fl Ind 1 287 Gambl

Sikkim and *S. punduana*

*Rata gogen* Nep *Spha*

or shrubs *S. Roxburghii* Wall Hook Fl Ind 1 287 Kurz 1 103, Gamble 287

up Sylhet *Ouli gogen* Nep,

Sikkim the Khasia Hills and

Kurz 1 104 (*Ternstroemia*

1 *S. napaulensis*, DC, Hook Fl Ind 1 286, Brandis 25,  
 Gamble 8 Vern *Gogina*, *goganda*, Hind, *Gogen*, Nep, *Kasur*, *Lepcha*

A small tree. Bark reddish-brown, thin. Wood light pink, very soft spongy, shrinks much. Pores small. Medullary rays fine and moderately broad, prominent on a radial section.

Outer Himalaya from the Jumna to Bhutan above 3000 feet Khasia Hills

Weight 20 lbs per cubic foot. Leaves lopped for cattle fodder

E 2321 Takdah Darjeeling 5000 feet

lbs  
25

## 3 SCHIMA, Reinw

Six species *S. crenata* Korth, Hook Fl Ind 1 289 Kurz 1 107 (*Gordonia*  
*oblata* Roxb Fl Ind 1 572 *G. floribunda* Wall) is an evergreen tree of Burma

*S. khasiana* Dyer Hook Fl Ind 1 289 is a

*S. monticola* Kurz 1 107 is a tree of the

Martaban at 6000 to 7200 feet and *S. banca*

Eng forests of Martaban and Tenasserim

1 *S. Wallichii*, Choisy, Hook Fl Ind 1 289, Gamble 8  
*Gordonia integrifolia*, Roxb Fl Ind 1 572 Vern *Chilauni*, *goe-chassi*,

Nep, *Makusal*, Hind, *Sumbrong*, *Lepcha*, *Gugera*, Goalpara, *Makriah*

*chilauni*, *makusal*, Ass, *Dingan*, Khasia, *Bollah*, Garo, *Jam*,

*Cichar*

A large evergreen tree. Bark black or dark grey with deep vertical cracks. Wood rough, red, moderately hard, shrinks much in seasoning, but is durable. Pores moderate sized and small, round, extremely numerous and uniformly distributed. Medullary rays very fine, uniform, equidistant, very numerous on a radial section visible as narrow, darker coloured plates.

strength —

Kyd with Goalpara wood in 1831 No 48 bar  $2' \times 1 \times 1$

Bratis with Sikkim in 1864 bar  $6 \times 2 \times 2$

Sylhet's with one or four specimens in 1873

Weight found	P =
13 lbs	383
40	760
15	

# ORDER XVI DIPTEROCARPEÆ.

An order of great forest importance containing large resinous trees and a few climbing shrubs belonging to seven genera, viz, *Dipterocarpus*, *Anisoptera*, *Antopandra*, *Vatica*, *Shorea*, *Hopea* and *Fateria*. *Doona* and *Monopandra* are

liquid by incision

The Dipterocarpeæ here described have a uniform structure. The poles are round, often sized, enclosed in a moderately broad, distinct, dark coloured, heavy (from 40 to 70 lbs) and resinous, exuding wood oils or dammer, which are found, not in separate resinous ducts, but in the pores (vessels) of the wood. The wood of most species is hard, strong and durable, that of several species of *Dipterocarpus* is softer and perishable

## I DIPTEROCARPUS, Gaertn f

Twelve species, all lofty trees, of Eastern Bengal, South India and Burma. These species are —

- 1 *D. turbinatus*, Gaertn f Eastern Bengal, Burma and Andamans
- 2 *D. laevis*, Ham Burma
- 3 *D. castaneus*, Wall Hook Fl Ind : 295 Tavoy
- 4 *D. obtusifolius* Tysan Hills of Prome and Martaban
- 5 *D. pilosus* Roxb Fl Ind ii 615 Hook Fl Ind : 296, Kurz : 115 Vern *Hollong* and Tenasserim
- 6 (*D. Hasseltii* Bl Kurz : 114) Tenasserim and Andamans
- 7 *D. tuberculatus*, Roxb Chittagong and Burma
- 8 *D. scaber* Ham, Hook Fl Ind : 297 Eastern Bengal
- 9 *D. alatus* Roxb Chittagong and Andamans
- 10 *D. incanus* Roxb Fl Ind ii 614, Hook Chittagong, Andamans
- 11 *D. Griffithii* Mlg, Hook Fl Ind : 299, Tenasserim and Andamans.
- 12 (*D. costatus* Gaertn, Kurz : 117 Under Hills of Chittagong, Martaban and Tenasserim

and Kurz,  
Kurz, the  
Vol xvi

The species of *Dipterocarpus* have a reddish, soft or moderately hard heartwood, generally rough. Pores visible on a vertical section, moderately sized to large. Medullary rays often of two sizes, fine and moderately broad. 1. *D. turbinatus*, Gaertn f, Hook Fl Ind : 295, Roxb Fl Ind ii 612, Kurz : 111 The Gurnee-Old Tree. Vern *Gurnee*, *Wingagurnee*, Beng, *Kanyung*, Mlg, *Kanyin-nee*, *Kanyin-wellonung*, Burm.

A lofty evergreen tree. Wood rough, moderately hard; heartwood reddish grey. Pores round, large and moderate-sized, joined by short concentric bands of soft tissue. Medullary rays prominent, broad and very fine, a large number of the latter intervening between a pair of the former; very prominent and shining on a radial section.

Eastern Bengal, Chittagong, Burma and the Andaman Islands. Skinner, No. 61, gives the weight at 45 lbs. and  $P = 762$ ; Kurz gives 55 lbs. for the weight, while our specimens average 50 lbs. per cubic foot. The wood is used for house-building and for canoes in Burma; and the wood-oil is used in painting houses and ships.

E 709.	Chittagong.	49	49	43	52	56
B 293.	Burma (1867)	.	.	.	.	.
B 2216.	Andaman Islands (Major Ford, 1866)	.	.	.	.	.
B 2555.	Burma (1862)	.	.	.	.	.

2. *D. laevis*, Ham.; Kurz i. 114. *D. turbinatus*, Hook. Fl. Ind. i. 295 (in part). Vern. *Kanyin*, *kanyin-nee*, Burm.

A lofty tree. Sapwood white; heartwood rough, reddish, soft. Pores moderate-sized, numerous. Medullary rays red, fine, moderately broad and broad, visible on a radial section as long bands, the distance between two broader rays equal to two to four times the transverse diameter of the pores.

Tropical forests throughout Burma.

Weight: our specimens give an average of 46 lbs. per cubic foot. The wood is rarely used, but is occasionally employed for planking and rafters. It yields copiously a resin and a wood-oil used for painting.

B 292.	Burma (1867)	.	.	.	.	.	43
B 2506.	" (1862)	.	.	.	.	.	49
<i>D. indicus</i> , Beddome t. 94.	Vern. <i>Guga</i> , Kan., of the Western Ghats, is referred to this or to <i>D. turbinatus</i> by Dyer.	.	.	.	.	.	.

3. *D. obtusifolius*, Teyssm.; Hook. Fl. Ind. i. 295; Kurz i. 115. Vern. *Kanyin-kok*, Burm.

A large deciduous tree. Bark  $\frac{3}{4}$  inch thick, ash-grey, longitudinal-ally cracked, rough. Heartwood reddish brown, rough, moderately hard. Pores large and moderate-sized. Medullary rays fine and very fine, numerous.

Eng forests of Prome and Martaban, ascending to 3,000 feet. Weight, 59 lbs. per cubic foot.

B 3128.	Kya-ang, Attaran Valley, Burma	.	.	.	.	.	59
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4. *D. tuberculatus*, Roxb. Fl. Ind. ii. 614; Hook. Fl. Ind. ii. 297; Kurz i. 113. *D. grandiflorus*, Wall. The Eng Tree. Vern. *Bug*, Burm.;

*Sookin*, Taling. A large deciduous gregarious tree, with dark grey bark, forming the "Eng forests" of Burma. Wood red, hard. Pores circular, large and moderate-sized, often filled with resin. Medullary rays prominent, moderately broad, with a number of fine rays between each pair of broad ones; distance between broader rays as much as twice transverse diameter of pores.

Chittagong and Burma. Weight: Brandis in Burma List of 1862, No. 12, gives 55 lbs.; Skinner, No. 63, gives 45 and Benson 46 lbs.; while the average of our specimens gives 54 lbs. Benson

gives P = 758, Spinner 760. The timber is very largely used in Burma for building, canoes, and house posts. It gives no wood oil, but a clear yellow resin.

[illegible]

5. *D. alatus*, Roxb. Fl. Ind. ii. 614, Hook. Fl. Ind. i. 298; Kurz  
i. 116. Vern. Gurjun, Beng.; *Kanyin, kanyin-pyoo*, Burm.

ALL  
SALES

B 818	Burma		.	:	.	.	.	.	.	: 60 lbs.
B 2213.	Andamans (1866)	(rather eaten)	.	:	.	.	.	.	.	: 38

6. *D. zeylanicus*, Thwaites Enum. 33, Hook. Fl. Ind. 1. 297; Beddome xxv. Vern. *Hoid*, Cingh.

Ceylon, up to 3,000 feet  
Weight, 45 lbs per cubic foot  
Gum resin  
Wood used for building. It gives a wood oil and

No 37 Ceylon collection . . . . . 45

E 720 is a wood sent from Cuttalong under the name *Micrannina*. In structure it resembles *Dipterocarpus*, and differs chiefly by the very numerous, very fine, equidistant medullary rays. The pores are joined by white, wavy concentric lines. The wood is interrupted by concentric belts of fibrous substance resembling liber, about 1/16 inch thick.

E 1257. (43 lbs) from Tezpur, Assam, has the structure of *Dipterocarpaceae*.  
 ng, *Chakya*, Mez, from Chittagong, is  
 it is distinguished by numerous broad and fine  
 can subdivided pores

## 2. VATTICA, Lima.

Six species. *V. grandiflora*, Dyer, Hook. Fl. Ind. 301 (*Antioptera odorata*, Kunz. 112. *Hopsea grandiflora*, Wall) is a deciduous tree of Martaban and

Trunk is used for making canoes. *V. Korobnykhana*, Bl., Hook & Th., 1302. - Macassar island, whose name is used for the Western Coast and Ceylon, yielding a gum resin.

1. *V. lanceifolia*, Bl.; Hook. Pl. Ind. i. 302; Kurz i. 122; Roxb. Pl. Ind. ii. 601. Vern. *Morhal*, Ass.; *Moa*, Sylhet; *Panthiya*, Burm. A large tree. Heartwood red, rough, hard. Pores small, numerous, uniformly distributed. Medullary rays fine, not distinct.

A lofty evergreen tree. Wood rough, moderately hard; heartwood reddish grey. Pores round, large and moderate-sized, joined by short concentric bands of soft tissue. Medullary rays prominent, broad and very fine, a large number of the latter intervening between a pair of the former; very prominent and shining on a radial section.

Eastern Bengal, Chittagong, Burma and the Andaman Islands.

Skinner, No. 64, gives the weight at 45 lbs. and P = 762; Kurz gives 55 lbs. for the weight, while our specimens average 50 lbs. per cubic foot. The wood is used for house-building and for canoes in Burma; and the wood-oil is used in painting houses and ships.

E 709.	Chittagong	49	43	52	56
B 293.	Burma (1867)	.	.	.	.
B 2216.	Andaman Islands (Major Ford, 1866)	.	.	.	.
B 2555.	Burma (1862)	.	.	.	.

## 2. *D. lævis*, Ham.; Kurz i. 114. *D. turbinatus*, Hook. Fl. Ind. i.

295 (in part). Vern. *Kanyin*, *kanyin-nee*, Burm.

A lofty tree. Sapwood white; heartwood rough, reddish, soft. Pores moderate-sized, numerous. Medullary rays red, fine, moderately broad and broad, visible on a radial section as long bands, the distance between two broader rays equal to two to four times the transverse diameter of the pores.

Tropical forests throughout Burma.

Weight: our specimens give an average of 46 lbs. per cubic foot. The wood is rarely used, but is occasionally employed for planking and rafters. It yields copiously a resin and a wood-oil used for painting.

B 292.	Burma (1867)	43	49
B 2506.	" (1862)	.	.

*D. indicus*, Beddome t. 94. Vern. *Guga*, Kam., of the Western Ghats, is referred to this or to *D. turbinatus* by Dyer.

## 3. *D. obtusifolius*, Teyssm.; Hook. Fl. Ind. i. 295; Kurz i. 115.

Vern. *Kanyin-kok*, Burm.

A large deciduous tree. Bark  $\frac{3}{4}$  inch thick, ash-grey, longitudinal-ally cracked, rough. Heartwood reddish brown, rough, moderately hard. Pores large and moderate-sized. Medullary rays fine and very fine, numerous.

Eng forests of Rome and Martaban, ascending to 3,000 feet. Weight, 59 lbs. per cubic foot.

B 3128.	Kya-ang, Attaran Valley, Burma	59	59
---------	--------------------------------	----	----

## 4. *D. tuberculatus*, Roxb. Fl. Ind. ii. 614; Hook. Fl. Ind. ii. 297; Kurz i. 113. *D. grandiflorus*, Wall. The Eng tree. Vern. *Bug*, Burm.;

*Scoala*, Taleing.

A large deciduous gregarious tree, with dark grey bark, forming the "Eng forests" of Burma. Wood red, hard. Pores circular, large and moderate-sized, often filled with resin. Medullary rays prominent, moderately broad, with a number of fine rays between each pair of broad ones; distance between broader rays as much as twice transverse diameter of pores.

Chittagong and Burma.

Weight: Brandis in Burma List of 1862, No. 12, gives 55 lbs.; Skinner, No. 63, gives 45 and Benson 46 lbs.; while the average of our specimens gives 51 lbs. Benson



gives  $P=758$ , Skinner 750 The timber is very largely used in Burma for building, canoes, and house posts. It gives no wood oil, but a clear yellow resin.

B 2505	Burma (1862)	50
B 306	" (1867)	52
B 2480	"	59

5. *D. alatus*, Roxb Fl Ind ii 614, Hook Fl Ind i 298, Kurz i 116. Vern *Gurjun*, Beng, *Kanyin*, *kanyin pyoo*, Burm A very large tree with grey bark Sapwood white, heartwood reddish grey, moderately hard, smooth, mottled Pores scanty, large, often oval and subdivided Medullary rays undulating, short, fine and moderately broad, not prominent Pores prominent on a longitudinal section

specimen gives  $P=727$  The

B 818	Burma	50
B 2243	Andamans (1866) (rather eaten)	38

6. *D. zeylanicus*, Thwaites Enum 83, Hook. Fl. Ind i. 297, Beddome xxv. Vern. *Hoid*, Cingh. Heartwood red, moderately hard Pores moderate-sized to very large Medullary rays fine and moderately broad, frequently bending.

Ceylon up to 3,000 feet Weight, 45 lbs per cubic foot Wood used for building. It gives a wood oil and gum resin

E 720	it resembles distant species wood is in
structure	ne, equal
es The	, about $\frac{1}{2}$

2. VATICA, Linn.

Six species *V. grandiflora*, Dyer, Hook. Fl Ind i 301 (*Ansoptera odorata*, Kurz i 112 *Hopoe grandiflora*, Wall) is a deciduous tree of Martaban and Tinsasserim, where also are found *V. faginea*, Dyer, Hook Fl Ind i 301, and *V. lefferi*, Dyer, Hook Fl Ind i 301 (*Shorea Helferi*, Kurz i 119) *V. scaphula*, Dyer, Hook Fl Ind i 301 (*Hopoe scaphula*, Roxb Fl Ind ii 611, Kurz i 121) Vern *Boilakura*, Beng, is a tree of Chittagong, especially on Mascal island, whose trunk is used for making canoes *V. Korburchiana*, Bl. Hook Fl Ind i 302, Beddome t 95 Vern *Mendora*, Cingh, is a large tree of the Western Coast and Ceylon, yielding a gum resin

1. *V. lanceolata*, Bl, Hook. Fl Ind i 302, Kurz i. 122, Roxb. Fl Ind. ii 601. Vern. *Morhal*, Ass, *Moa*, Sylhet; *Panthitya*, Burm A large tree. Heartwood red, rough, hard Pores small, numerous, uniformly distributed. Medullary rays fine, not distinct.

(m.) the weight per cubic foot

The wood is not very good. The tree

B 2508. Burma (1862)

B 2282. Andamans (1866)

We identify this last by the structure

Andamans.

### 3. SHOR

Nine species. *S. floribunda*, Kurz. i. 1

tree of Tavoy. *S. assamica*, Dyer; Hoo-

discovered by Gr. Mann on the banks of the

FI. Ind. i. 307 (*Hopon gwaissima*, Wall.;

Wood generally cross-grained.

hard. Pores moderate-sized to

patches of lighter coloured tissue. M-

1. *S. stellata*, Dyer; Hook. FI.

Kurz i. 117. Vern. *Koungmho*, Bu.

A very large evergreen tree.

longitudinally fissured. Wood w

moderate-sized to large, uniformly

substance; each pore enclosed in

rays moderately broad; the distance b

the transverse diameter of the pores.

Burma.

Weight, 47 to 50 lbs. The wood is a

B 1944. Tavoy, Burma

B 2481. Tennasserim

2. *S. Talura*, Roxb. FI. Ind. ii

*S. laccifera*, Heyne; Beddome t. 6.

*Talura, taluri*, Lam.; *Jakari*, Tel.; *Ja*

A large tree. Bark grey, with

very to extremely hard, smooth, wi

shaped heartwood. Pores small

enclosed in patches of white tissue, wh

wavy, forming interrupted concentric

but alternating belts, with numero

rays fine, very numerous, frequently w

Mysore and the eastern districts of Madras

Weight: Puckle gives 43 lbs. per cubic

Puckle finds  $P = 896$ . The wood is much us

down to Madras for that purpose.

D 1056. South Arcot

D 1092. Madura

D 1092 has a smooth, yellow, even-grain

brownish-red heartwood, but the structure of

3. *S. robusta*, Gaertn.; Roxb.

Brandis 26; Kurz i. 119; Gamble

*salwa, salbin, sakher*, Hind.; *Sakwa*, Ne.

*Salwa, sorringhi*, Uruya; *Koroh*, Oudh;

A large gregarious tree, never quit

smooth with a few long, deep, vertical

thick, dark coloured, rough, with d-

small, whitish, not durable. Heartwood brown, finely streaked with dark lines, coarse-grained, hard, with a remarkably fibrous and cross-grained structure, the fibres of successive concentric strata in the wood do not run parallel but at oblique angles to each other, so that when the wood is dressed the fibres appear interlaced, does not season well. Annual rings visible. Pores moderate-sized to large, often filled with resin, each pore or group of pores in a patch of whitish tissue. Medullary rays uniform, moderately broad, straight, very prominent, joined by short white transverse lines, clearly visible on a radial section as numerous interrupted bands, the distance between the medullary rays equal to the transverse diameter of the pores.

The wood of the

correspond to one year young trees (up to to the age of the tree collected. Assuming, however that the concentric rings are annual, the following

information is available regarding the rate of growth of sap In 1873 Mr. Fisher examined 40 sap trees in the Pantan Reserve, Kaimrup district,

wood only of 18, 30, 51 and 72 inches

In 1874 he examined 33 trees in

of radius, 10 trees of 3 feet girth

10 trees of 4 feet 6 inches girth

6 feet 7 inches girth gave 110 ring

girth gave 122 rings, or 106 rings per inch of radius

In 1875 he examined 20 trees in the Sidli forests Goalpara district,

In 1876 he examined 11 trees in the same forests 4 trees of 4 feet 6 inches girth gave 76 rings, or 88 rings per inch of radius, 7 trees of 3 feet girth gave 61 rings,

or 88 rings per inch

In 1877 he examined 17 tr

rings or 9 rings per inch of ra

ings per inch of radius, 13

inch of radius, and 2 trees of

The rings were counted in (

counting of the rings was as follows —

Localities		Number of trees		Rings counted on a length of radius from centre, corresponding to a girth (wood only) of	
	120	17	20	61	63
	11	20	20	61	63
	11	20	20	61	63
	11	20	20	61	63
	11	20	20	61	63
	120	17	20	61	63
	11	20	20	61	63
	11	20	20	61	63
	11	20	20	61	63
	11	20	20	61	63
1 Asian (on 11) 11 2 all 14 5 3 all 14 5 4 all 14 5 5 all 14 5					

On an average the number of rings per inch of radius is 10, and it will be noticed that the annual increments are exceedingly uniform. A tree grows:—

up to 18 inches girth (wood only) in 30 years.	from 18 to 36	"	"	"	in 26
	36 to 54	"	"	"	in 27
	54 to 72	"	"	"	in 29

In the Oudh forests a different result has been obtained. When the first proposals were made in 1863 to regulate the working of the forests of the Khairi division, the following was assumed as the mean rate of growth:—

Girth 18 inches, age 15 years.	54	"	72	"	80
	50	"		"	

Subsequent data seeming to indicate a somewhat slower rate, it was estimated in 1868, in order to settle the number of trees to be cut over in 1868 and 1869, that a girth of 54 inches would be attained in 65 years, and a girth of 72 inches in 95 years.

In September 1869, Mr. Forrest examined 50 logs cut in the Newal Khar subdivision of the Khairi forests; these logs had a mean girth of 5 feet 3 inches and gave on an average 4.79 rings per inch of radius. Again in 1877 a sal tree about 16 or 17 years old was examined by Captain Wood, and at 1 foot from the base, where the girth was 1 foot 10 inches, it was found that an inch of radius contained 4.80 rings. Thus, supposing we take 5 rings to the inch as indicating the average rate of growth, the trees examined in Oudh would have attained a girth of 6 feet in 57 years, which, it will be seen, is about one-half the time which the trees examined by Mr. Fisher in the Diuars required to attain the same size.

In the Central Provinces the counting of rings has given a mean between Bengal and Oudh. In 1867, Captain Douglas examined 13 stumps in the Bifferaggarh forests; their mean girth at 17 inches from the ground was 5 feet 3 inches, and the average number of rings per inch of radius was 6.5. In 1874 Mr. Fernandez examined a single stump in the same forests, and 7.2 rings were counted per inch of radius. The mean of the results of these countings is 6.85 rings per inch, which would place the age of a tree 6 feet in girth at 78 years. Subsequent observations in the Banjar Valley forest, Mandla district, give a mean of 5 to 8 rings per inch and tend to confirm this rate of growth.

The following cultivated trees of known age were measured by Mr. Brandis in 1863:

Sabarapur, and Eastern Jumna Canal 13 years, girth 27 inches (average of 33 trees).	30	"	54½	"	69	"	Calcutta
	35	"	79½	"			
	25	"		"			

The weight of a cubic foot of seasoned wood is generally found to vary between 50 and 60 lbs. The average of the experiments recorded below is 59 lbs., but while Baker's experiments (85) give an average of 61.6 lbs., Brandis' experiments (114) give only 53.6 lbs. as the average. The average of the 13 specimens weighed in 1878, omitting the last, is 59 lbs., but this includes unseasoned or only partially seasoned wood; the average weight of the Garhwal (O 204) and Mandla (C 173) specimens, which were thoroughly seasoned, is 61 lbs. Clifford gives 55 lbs. as the weight of sal when perfectly dry; 54 to 55 lbs. may therefore be considered as the average weight of seasoned sal. The transverse strength has been tested by numerous experiments. The value of P as determined by Brandis, Baker and others, ranges from 648 to 939, the mean value being 790. The following abstract shows the results of all the best experiments on this timber.

Experimented by whom	Year	Wood whence procured	No of specimens	Size of bar	Weight	Value of
Brands	1864	Bengal (Morung)	28	6 x 2 x 2	67	800
"	"	"	8	6 x 2 1/2	58	817
"	"	"	20	2 1 1	60	745
"	1865 66	"	11	3 1 1	60	916
"	"	"	14	2 1 1	49	609
"	"	(Darbhanga)	13	6 x 2 2	61	708
"	"	"	12	6 x 2 1 1/2	64	91
"	"	"	8	3 1 1	68	894
Baker	18 2	(Morung)	31	7 x 2 2	69	78
"	"	"	64	6 x 2 2	64	792
"	"	"	24	3 1 1 1/2	603	803
"	"	"	6	7 x 2 2	69	89
"	"	Deogul	9	7 x 2 2	61	717
"	"	"	3	3 1 1/2	609	809
"	"	"	18	2 1 1	63	816
"	"	Go alhpur	10	6 x 2 2	62	816
"	"	P hilt	6	7 x 2 2	63	602
Campbell	1631	Morung (seasoned)	4	6 x 2 2	65	80
"	"	(unseasoned)	4	6 x 2 2	68	662
"	"	Gorkh pur	1	6 x 2 2	60	894
Skinner No 137	1862	North ern India	25		85	880
Kyd	1831	Morung	1	2 1 1	54	850
Cunningham	1854	Gwalior	3	2 1 1	60	1 007
W. b		India and Nepal	3		47	
Smylees	18 8	Many localities (See I st)	13		69	

The following is a summary of Mr Clifford's remarks about sal in his Memorandum on the Timber of Bengal

The

and el it

avidity in

with the canous of wood is when once thoroughly seasoned stands almost without a rival as it remains without being

Mr Clifford in the

they are known as 'Morung' and 'Darbhanga' one from the forests to the east of the Cooc the other from the forests to the west. The Morung sal is the best, it is



4 S obtusa, Wall, Hook II Ind 1 306, Kuiz 1 118 Vern *Thi/a*, Burm

A large tree Bark  $\frac{1}{2}$  inch thick, grey, with deep longitudinal fissures Heartwood the colour of sal, very hard and durable Pores moderate to large, often filled with resin, each pore surrounded by a narrow white ring Medullary rays moderately broad to broad, numerous, joined by short irregular transverse bars or lines of lighter coloured tissue The wood of this tree is more even grained than that of either sal or *engyin*

King forests of Burma  
We ght accord  
No 17 gives 67 lbs  
gives P = 730  
canoes and in building and is valuable for tool handles and planes

B 500 Frome Burma  
B 506  
B 2973  
B 283 Burma (1867)  
66  
62  
67  
64  
lbs

5 S Tumbugara, Korb FI Ind 1 617, Hook FI Ind 1 306, Beddome xxvi, t 5 *Vatica Tumbugara*, W and A Vern *Cungu, congo, tambugar, tambagum, Tam, Thamba, googigapu kara, Tel, Pandoga,*

A large tree Wood smooth, harder than that of sal but similar in structure Medullary rays shorter and somewhat unequal Concentric lines more numerous and more distinctly marked

s  
y  
e  
r

D 1062 Cuddapah  
D 1078 North Arcot  
lbs  
68

6 S siamensis, Miq, Hool FI Ind 1 304 *Pentacme siamensis*, Kurz 1 119 Vern *Rugyin*, Burm  
A large deciduous tree Bark  $\frac{1}{2}$  inch thick, dark grey, with deep vertical fissures Heartwood very hard, very heavy and cross grained, in this respect similar to sal, which it also resembles in colour Pores moderate sized, rarely large, sometimes in groups and filled with resin, enclosed in narrow white rings and joined by fine, wavy, concentric lines Medullary rays fine, numerous, equidistant

King forests of Burma  
We ght Burma List of 1862 No 16 gives 65 lbs our specimens average 51 lbs The wood is much prized on account of its durability, it is used for house building boats and other purposes It gives a red resin

B 2007 Burma (1862)  
B 31-7 Kyau-peng Mataran Valley, Burma  
B 2072 Frome Burma

lbs  
48  
63  
16

4 HOPDA, Roxb

Large labious or 1 oary to dentose reticulous trees E ght species of which are South Indian and 3 Burmese *H. longifolia* Dyer, Hook FI Ind 1 309 (*H. pa*

1. *H. odorata*, Roxb. Fl. Ind. ii. 609; Hook. Fl. Ind. i. 308; Kuntz i. 120. *H. eglandulosa*, Roxb. Fl. Ind. ii. 611. Vern. *Whingun*, Burm.; *Kirita*, And.

Eastern moist zone. Scattered in evergreen forests of British Burma and the Andaman Islands. The weight and transverse strength have been determined by the following experiments:—

[illegible]

B	282.	Burma (1867)	.	.	.	.	.	.	.	. 44
B	283.	"	.	.	.	.	.	.	.	. ...
B	546.	Martaban	.	.	.	.	.	.	.	. 53
B	2509.	Burma (1862)	.	.	.	.	.	.	.	. 43
B	2698.	Tavoy (Wallich, 1828)	.	.	.	.	.	.	.	. 52
B	2714.	"	.	.	.	.	.	.	.	. 49
B	2716.	"	.	.	.	.	.	.	.	. 56
B	511.	Andaman Islands	.	.	.	.	.	.	.	. 51
B	2201.	"	.	.	.	.	.	.	.	. 54
(Major Ford, 1866)			.	.	.	.	.	.	.	

A large tree. Wood brown, hard and close-grained. Pores small and moderate-sized, numerous. Medullary rays moderately broad, prominent, generally bent where they touch the pores, uniform and equidistant. Western moist zone. Malabar and South Kanara, up to 3,500 ft. Weight, 62 to 63 lbs.

*logh, tree, Kan.; Trubogam, Malabar.*  
A large tree. Wood brown, hard and close-grained. Pores small and moderate-sized, numerous. Medullary rays moderately broad, prominent, generally bent where they touch the pores, uniform and equidistant. Western moist zone. Malabar and South Kanara, up to 3,500 ft. Weight, 62 to 63 lbs.



The wood is of good quality though scarcely known. It is valued in South Kanara for building temples and may be found useful for sleepers.

W 715 South Kanara  
W 709

W 67  
W 63

## 6 VATTARIA, Linn

Only one species is indigenous in India, though fourteen are described from Ceylon.

1 *V. indica*, Linn, Hook. Fl. Ind. 1: 313, Roxb. Fl. Ind. 1: 602.

*V. malabarica*, Blume, Beddome t. 84. The Pinney Vernish or Indian

Opal Tree. Vern Pinney maram, dhyup maram, vallay kungliam,

ondricam, Tamil, Duppa maram, dhyupa, pami, munta dhyup, Kan,

Dupada, Tel, Fagan, pami maram, vella kondrikam Mal, Hal, Cingh

A large evergreen tree, bark whitish. Sapwood white with a tinge

of red, heartwood grey, rough, moderately hard, porous. Pores small and

moderate sized, often in groups. Medullary rays fine and broad, very

prominent on all vertical sections, while on a radial section they appear

as rough plates with white shining fibres between them. The dis-

ance between the broad rays is generally greater than the transverse

diameter of the pores.

Western moist zone. Western Ghats from Kanara to Travancore ascending to

coffins and the masts

W 747 South Kanara  
W 1187

W 41  
W 41

## 6 DOOVA, Thwaites

A genus of Ceylon trees. 10 species

1. *D. zeylanica*, Thwaites. Linn. 34, Hook. Fl. Ind. 1: 311, Bed-

domme t. 97. Vern Doon, Cingh

A large tree. Bark rough and cracked. Heartwood the colour of

al, moderately hard. Pores large, often subdivided. Medullary rays

fine, uniform and equidistant, the distance between the rays less than

the transverse diameter of the pores.

housebuilding. The tree

red in spirits of wine or

No. 25, Ceylon Collection

W 23  
W 23

## ORDER XVII MALVACEAE

The ten genera belong to two Tribes, viz. :—

- Tribes I.—*Hibiscæ* . . . . . *Decaschistia*, *Dicellostyles*, *Hibiscus*  
 and *Thespesia*.  
 II.—*Bombacæ* . . . . . *Kydia*, *Adansonia*, *Bombax*, *Erioden-*  
*dron*, *Gulkenia* and *Durio*.

*Decaschistia* contains 2 shrubs of Southern India. *Dicellostyles jynubifolia* Benth.; Hook. Fl. Ind. i. 333; Gamble 10. Vern. *Kubinda*, Nep.; *Dantaglar*, Lepcha; Brandis 30, the Baobab Tree. Vern. *Gorak imli*, Hind.; *Kalp briksh*, Ajmere, Delhi; *Paparapulia*, Tam., was introduced from tropical Africa and is now cultivated here and there, chiefly in South India and Bengal, but occasionally as far north as Gurgaon (see 'Indian Forester,' Vol. iv. i. p. 102, for description of a tree at Tilpat, measuring 22 feet in girth and rising 50 feet to the first branch). Brandis mentions 3 trees at Deogarh in the Central Provinces, respectively measuring 16, 22 and 40 feet in girth, and there are one or two good-sized trees at Calcutta and Barrack-pore. It is being experimentally planted at Calcutta and in the Sundarbans; as, were it capable of easy cultivation, its rapid growth, valuable fibre and fruit would make the extension of its growth desirable; as yet, however, it has not succeeded. *Eriodendron anfractuosum*, DC.; Hook. Fl. Ind. i. 350; Beddome xxx. (*E. orientale*, Steud.; Kurz i. 131. *Bombax pentandrum*, Roxb. Fl. Ind. iii. 165) the White Cotton Tree. Vern. *Safed simal*, *senthal*, *hatian*, *katan*, Hind.; *Shcet simil*, Beng.; *Ilavam*, Tam.; *Buruga pur*, *kadam*, Tel.; *Shamitula*, Mar.; *Pania*, Mal.; *Imbil*, Cingh., is a tall deciduous soft-wooded tree of India and Burma, often planted. Skinner, No. 67, gives its weight as 30 lbs., and P = 400. *Gulkenia excelsa*, Wight; Hook. Fl. Ind. i. 350; Beddome xxx. Vern. *Malai-konyi*, *aini-pillao*, Tam.; *Kattu-bodde*, Cingh., is a tall white-wooded tree of the Western Ghats and Ceylon, having a large globose, spiny fruit. Vern. *Durio Zibelhinus*, DC.; Hook. Fl. Ind. i. 351; Roxb. Fl. Ind. iii. 399; Kurz i. 132. Vern. *Duyin*, Burm.; *Durian*, Malay, is the well known and much prized fruit tree, yielding the Durian or Civet-Cat fruit. It is wild in South Tensasserim, but is cultivated as far north as Moumein.

Wood generally soft, a few species with small dark coloured heart-wood. Pores moderate-sized to large. Medullary rays fine or moderately broad. *Kydia calycina* and *Hibiscus syriacus* have transverse bars across the rays.

## 1. HIBISCUS, Medik.

A genus of herbs, shrubs, climbers or small trees. The 9 Indian woody species consist of 2 small trees, 2 shrubs, 1 climber and 5 introduced garden shrubs. *H. frangans*, Roxb. Fl. Ind. iii. 193. Vern. *Kinturkur*, Beng., is a small tree of Assam and Cachar. *H. macrophyllus*, Roxb.; Kurz i. 126 (*H. setosus*, Roxb. Fl. Ind. iii. 194) Vern. *Kachia udal*, *kasypala* Beng.; *Sho, dayban*, Magh; *Xeticoon*, Burm. (Weight, 27 to 28 lbs. per cubic foot, according to Walllich) a small handsome, large-leaved tree of Eastern Bengal, Chittagong and Burma, said by Kurz to have a rather heavy wood, and to give a good rope-making fibre. *H. scandens*, Roxb. Fl. Ind. iii. 200; Kurz i. 127; Gamble 10, is a large climbing shrub of Eastern Bengal from Sikkim to Chittagong; and *H. collinus*, Roxb. Fl. Ind. iii. 198. Vern. *Kandagang*, Tel., a large shrub of the Eastern Madras coast. *H. rosa-sinensis*, Linn., the Shoe Plant. Vern. *Juwa*, *oru*, Beng.; *Khoungyan*, Burm. with brilliant, large, red flowers; *H. tricusps*, Banks; *H. mutabilis*, Linn.; and *H. syriacus*, Linn. Vern. *Gurhul*, are all shrubs which have been introduced and are now cultivated in gardens.

1. *H. tiliaecus*, Linn.; Hook Fl. Ind. i. 343; Roxb. Fl. Ind. iii. 193; Beddome xxix; Kurz. i. 126. Vern. *Bola*, *chela*, Beng.; *Thengben*, *thimban*, Burm.; *Belligobel*, *bellighatta*, Cingh. Pores very numerous, small- and moderate-sized, often subdivided. Medullary rays fine and moderately broad, not very prominent.

Coasts of India, Burma and Ceylon.  
 Weight, 35 to 38 lbs. per cubic foot.

The wood is not used, except as fuel. It gives a blackish white resinous exudate used in Bengal for rough ropes.

E 405	Sundarbans	No 7	Ceylon Collection (marked <i>Pavonia tiliacum</i> )
38			
35			
13			

## 2 THEPSIDIA, CORR.

Two species *T. Lampas*, Dalz and Gies, Hook. f. Ind. 1 345 Kurz 1 128, Gamble 10 (*Hibiscus Lampas* and *tetracarpus*, Roxb. f. Ind. 1 197, 198) Vern. *Bonkapash*, Ass (Wallach), *Kondapatti*, Tel. is a shrub found in most parts of India, whose wood, according to Kyd, weighs 29 lbs and  $P = 407$ .

1 *T. populnea*, Corr, Hook. f. Ind. 1 345, Beddome t 63, Kurz 1 128 *Hibiscus populneus*, Willd., Roxb. f. Ind. 1 190 The Portia Tree or Tulip Tree Vern. *Karapnu*, Hind, *Poresh*, *parash*, Beng, *Porta*, *purasa*, *portia*, *purasa*, *putrasung*, *putrasam*, Tam, *Gan-gayaga*, Tel, *Bendi*, Guz, Mar, *Sureya*, Cingh.

A moderate sized evergreen tree Sapwood soft, wood pale reddish, with small, dark coloured, hard heartwood. Pores moderate sized, scanty, subdivided, uniformly distributed. Medullary rays fine, uniform, the distance between two rays generally equal to the transverse diameter of the pores.

Coast forests of India Burma and the Andaman Islands. Planted throughout India.

Weight. Skinner No 130, and A Mendis give 49 lbs, our specimens give 50 lbs. Skinner give 50 lbs.

C 1050	Guzerat	No 61	Salem Collection
E 2488	Calcutta	B 2470	Andaman Islands (Kurze, 1866)
		No 28	Salem Collection (marked <i>Eugenia caryophyllifolia</i> )
No 80	Ceylon Collection	49	

## 3 KYDIA, ROXB

Besides the species described below, *K. glabrescens*, Mast, Hook. f. Ind. 1 348, is a tree of Bhutan and Assam.

1. *K. calycina*, Roxb., Hook. f. Ind. 1 348, Beddome xxviii; Brandis 29, Kurz 1 124, Gamble 10 *K. calycina* and *fraterna*, Roxb. f. Ind. 1 188, 189 Vern. *Pola*, *pula*, *pala*, *potari*, Hind, *Bartanga*, *dhori*, C P, *Kandind*, Nep, *Sedangtaglar*, Lepcha, *Alahow*, *Meeh*, *Boldobak*, Garo, *Kopasia*, Urya, *Poti*, *panthi*, *peddapoti*, *pedda kunyi*, Tel, *Buruk*, *bosha*, Gondi, *Bendi*, Kan, *Waring*, Mar, *Dwaboite*, Burm.

A small tree. Bark  $\frac{1}{2}$  inch thick, grey, peels off in irregular flakes. Wood white, soft, no heartwood. Annual rings marked by white concentric lines. Pores scanty, moderate sized, often oval and subdivided. Medullary rays short, fine to broad, numerous, joined by white transverse bars, and in this respect resembling *Anonaceae*, on a radial section distinctly visible as long straight bands.

Common in the forests of all parts of India and Burma, except the arid region. Growth fast, 1 to 8 m per inch of radius.

Weight: 40 to 45 lbs. per cubic foot according to density of specimens tested.  
 The wood is used for house-building, ploughs and carts, and for fuel.

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Weight, 31 lbs per cubic foot. The wood is more durable than that of *B. malabaricum*, the specimen from the Andamans had been 12 years in Calcutta in the rough, and was only slightly discoloured on being cut up.

B 2215 Andaman Islands (Major Ford, 1866)

31  
lbs

# ORDER XVIII. STERCULIACEÆ

An Order containing 15 Indian genera of herbs, shrubs, climbers or trees. Of these genera, three are herbs or (*Melastoma*) undershrubs, and the rest shrubs, erect or climbing, and trees. The Order is divided into 6 Tribes, viz —

- Tribes I — Sterculiæ
  - II — Helicteræ
  - III — Eriolaneæ
  - IV — Douglieæ
  - V — Hermanieæ
  - VI — Buettnerieæ
- Sterculia* and *Heritiera*  
*Reevesia*, *Kleinhovia*, *Helicteres*  
*Eriolaneæ*  
*Melastoma*  
*Melochia*  
*Albomia*, *Guazuma*, *Buettneria*  
*and Lepionychia*

Of the genera not here described, *Reevesia* contains two small trees *R. Wallichii*, *R. pubescens*, Mast., Hook F! Ind 1 364, Gamble 11, of Sikkim and the K 1919 Hills *Kleinhovia Rosrita*, Linn., Hook F! Ind 1 364, Koxb F! Ind in a, Beddome 1375, Hook F! Ind 1 375, Koxb F! Ind in 156, elsewhere in regions of

belongs to this family, and has been grown in some parts of India and in Ceylon. The genera of this family have little in common as regards the structure of their wood. The species of *Sterculia* have a very soft and light wood, that of *Heritiera* being very hard and heavy, while the wood of *Eriolaneæ* and *Pterospermum* is intermediate between the two.

## 1. STERCULIA, Linn.

*S. foetida*, Linn., Hook F! Ind 1 354, Koxb F! Ind in 155, Beddome xxxi, Kurz 1 136 Vern *Jangli badam*, Hind, *Pinnari*, Tam, *Gurapu badam*, Tel, *Miyai* with a lbs a 1 355 whose F! In *Balan* 139) Koxb 11 Burn,

The wood is generally light, soft, often spongy, with large pores and moderately broad or broad medullary rays, which are very prominent on a radial section.

1. *S. wrens*, Roxb. Fl. Ind. iii. 145; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 33; Kurz i. 135. Vern. *Gūlu, kulu, gular, tabai, tinnuku, Karrai*; Hind.; *Olla, hachanda*, Ass.; *Tabau*, Tel.; *Vellay putali*, Tam.; *Mittim, penoh*, Gondi; *Pakli*, Kuruk; *Karai, kandol, gwira*, Mar.; *Katru*, Ajmere; *Katauri*, Ranch Alabals.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, very smooth, white or

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, very smooth, white or greenish grey, exfoliating in large thin irregular plates. Wood very soft, reddish brown with an unpleasant smell, with lighter coloured sapwood. Prominent and regular concentric lines, which may possibly be annual rings. Pores large, often oval and subdivided, frequently filled with gum. Medullary rays moderately broad, on a radial section prominent as long, dark, undulating bands, giving the wood a mottled and reticulate appearance; the distance between the rays is larger than the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges eastwards, Southern India and Burma. Weight, about 12 lbs. per cubic foot; Kyal gives for Assam wood : Weight 18 lbs.,  $P = 103$ , but it seems probable that Kyal's specimen was not this, but *S. villosa*. Wood used to make native guitars and toys. It yields a gum called '*Kattia*' or '*Kattia*.' The seeds are roasted and eaten by Gonds and Kuruks in the Central Provinces. Its bark gives a good fibre, and fine specimens of it from Berar were sent to the Paris Exhibition of 1878 (C. 984 from Bairagarh Reserve, Aligahat).

P	471.	Ajmere	.	.	.	.	.	.	35
P	3220.	Nagpahr, Ajmere	.	.	.	.	.	.	...
C	1102.	Ahri, Central Provinces	.	.	.	.	.	.	39
D	1088.	Madura, Madras	.	.	.	.	.	.	51

2. *S. villosa*, Roxb. Fl. Ind. iii. 153; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 32; Kurz i. 136; Gamble 10. Vern. *Poshwa*, Suttley; *Udal*, udar, Hind.; *Gul-bodla*, gul-kandar, massu, Punjab; *Kanhhem*, *Lepcha*; *Kadar*, baringa, Gondi; *Bui*, Kurku; *Oma*, *odela*, *sakua*, Ass.; *Udare*, Garo; *Pake nar*, *arri*, *ant-nar*, Tam.; *Sambeng*, Magh.

A moderate-sized tree. Bark grey or brown. Wood grey, very soft, spongy. Annual rings prominent. Pores large, often subdivided. Medullary rays moderately broad, harder than the white spongy tissue between them, joined by numerous transverse bars. On a radial section the pores and medullary rays are distinctly visible, giving the wood a reticulate and mottled appearance.

Sub-Himalayan tract from the Indus eastwards; common in forests throughout

India and Burma. Growth fast, 3 to 6 rings per inch of radius. Weight, 15 to 22 lbs. per cubic foot. Wood not used. The tree is valuable on account of its fibre, which is coarse but strong. It is made into ropes and coarse bags, and in Bengal, Burma and South India into ropes and prestbands for drugging timber. Specimens were sent to the Paris Exhibition of 1878 from many provinces, but especially from Bengal and from Berar (C 986, for Bhatnagar Reserve, Melghat). It gives a white pellucid gum which exudes copiously from cuts in the bark. It copices freely, and is extremely difficult to extricate in clearings.

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E 2324.	Sivoke, Darjeeling Terai	.
E 620.	Bamunpokri, Darjeeling Terai	.
W 847.	South Kamara	.
E 22	.	.
E 15	.	.
E 20	.	.

3 *S. coccinea*, Roxb Fl Ind in 151, Hook Fl Ind 1 357, Kurz 1 137, Gamble 11 Vern *Sitio udal*, Nep, *Katior*, Lepcha small evergreen tree, with smooth, light grey bark. Wood grey, spongy, extremely soft. Structure similar to that of *S. urens*. Transverse bars distinct.  
 Eastern Himalaya ascending to 6000 feet Assam, Khasia Hills of Burma.  
 Weight 17 lbs per cubic foot  
 Bark used for the same purposes as that of *S. villosa* but less commonly.

E 573 Khokhlong Forest Darjeeling Terai  
 4 *S. colorata*, Roxb Fl Ind in 146, Hook Fl Ind 1 359, Beddome xxxii, Bran 138, Kurz 1 138, Gamble 11 Vern *Bodula*, *calena*, *samarri*, Hind, *Mocla*, Beng, *Sitio udal*, *phirphiri omra*, Nep, *Kanhyem*, Lepcha, *Bola ong*, Garo, *Khowsey*, pny, Bear, *Bhai kor*, Bombay, *Kayaka*, Tel, *Wel shaw*, Burm, *Betda*, And  
 A moderate sized tree. Bark grey. Wood grey, very soft. Structure similar to that of *S. urens*, but medullary rays broader and shorter, and transverse bars distinct.  
 Sub Himalayan tract from the Jumna eastwards Central and South India. Burma and the Andaman Islands.

radius Weight 24 lbs per cubic foot  
 specimens of the fibre were sent from Berar to  
 (Paragraph Reserve Melghat)  
 E 1391 Chittagong  
 24 lbs

2 HERITIERA Blume

Contains 3 Indian trees of which 2 are here described. They have simple leaves scaly beneath or silvery white. Besides the two here described *H. Komor* Buch Hook Fl Ind 1 363 (*H. minor* Roxb Fl Ind in 142 Kurz 1 141) is a tree of Sylhet Chittagong Arakan and the deltas of the Ganges and Irrawaddy. It has a red brown strong wood weighing 66 lbs per cubic foot and used for boats, bridges and house building.  
 Heartwood red very hard. Numerous transverse bars between the medullary rays.

1 *H. littoralis*, Dryand, Hook Fl Ind 1 363, Roxb Fl Ind in 142, Beddome xxxii, Kurz 1 140 Vern *Sunder*, *sunder*, Beng, *Pengal kanao*, Burm, *Nakda*, And  
 A small gregarious evergreen tree. Bark dark grey, with longitudinal cracks. Sapwood white, heartwood dark red, very hard, close-grained. Pores moderate sized to large, often oval and subdivided into compartments. Medullary rays uniform, moderately broad, short, wavy, with numerous, very fine, white, transverse bars, the distance between two rays being generally equal to the transverse diameter of the pores.  
 Coasts and tidal forests of Bengal the Peninsula, Burma and the Andaman Islands.  
 Weight as much as 101 lbs when wet according to Seebach. The weight of seasoned wood as well as the value of *P.* have been determined by the following

The wood is generally light, soft, o moderately broad or broad medullary ra, a radial section.

### 1. *S. urens*, Roxb. Fl. Ind. iii. 145;

xxxii; Brandis 33; Kurz i. 135. Vern. (

*karrar*, Hind.; *Olla, hatchinganda*, Ass.;

*Hittum, pinoh*, Gondi; *Takli*, Kurku;

*Kalru*, Ajmere; *Kalanuri*, Panch Mebals.

A large deciduous tree. Bark ½ in

greenish grey, exfoliating in large thin

soft, reddish brown with an unpleasant s

wood. Prominent and regular concent

be annual rings. Pores large, often ov

filled with gum. Medullary rays moder

prominent as long, dark, undulating ba

and reticulate appearance; the distance

the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges eastw

Weight, about 42 lbs. per cubic foot; Kyd gi

P = 103, but it seems probable that Kyd's spec

Wood used to make native guitars and toys

'*Katru*.' The seeds are roasted and eaten by G

vinces. Its bark gives a good fibre, and fine spec

the Paris Exhibition of 1878 (C. 984 from Baitag

P 471. Ajmere

P 3220 Nagpohar, Ajmere

C 1102 Ahir, Central Provinces

D 1088 Madura, Madras

2. *S. villosa*, Roxb. Fl. Ind. iii. 153;

xxxii; Brandis 32; Kurz i. 136; Gamt

*Udal, udar*, Hind.; *Gul-bodla, gul-kand*

*Lepcha; Kudar, baringa*, Gondi; *Bubi*,

Ass.; *Udare, Garo; Take nar, anni, anni*

A moderate-sized tree. Bark grey

soft, spongy. Annual rings prominent

divided. Medullary rays moderately br

spongy tissue between them, joined by nu

radial section the pores and medullary ray

the wood a reticulate and mottled appeara

Sub-Himalayan tract from the Indus eas

India and Burma.

Growth fast, 3 to 6 rings per inch of radius.

Wood not used. The tree is valuable on account

and breastbands for dragging timber. Specimens

1878 from many provinces, but especially from

Bairagarh Reserve, Melghat). It gives a white

from cuts in the bark. It coppices freely, and

clearings.

E 2324. Sivoke, Darjeeling Terai  
E 620. Bamunpokri, Darjeeling Terai  
W 847. South Kanara



3. *S. coccinea*, Roxb Fl. Ind. iii. 151; Hook. Fl. Ind. i. 357; Kurz i. 137, Gamble II. Vern *Sitio udal*, Nep., *Kalior*, Lepcha A small evergreen tree, with smooth, light grey bark. Wood grey, spongy, extremely soft. Structure similar to that of *S. wrens*. Transverse bars distinct.

Eastern Himalaya, ascending to 6,000 feet, Assam, Khasia Hills, hills of Burma  
Weight, 17 lbs per cubic foot  
Bark used for the same purposes as that of *S. villosa*, but less commonly

E 673 Khooklong Forest, Darjeeling Terai  
lbs  
17  
4 *S. colorata*, Roxb Fl. Ind. iii. 146, Hook. Fl. Ind. i. 359; Beddome xxxii, Brandis 34, Kurz i. 138, Gamble II. Vern *Bodula*, *walena*, *samarri*, Hind., *Mocla*, Beng., *Sitio udal*, *phirphiri*, *omra*, Nep., *Kanhiyem*, Lepcha, *Bolazong*, Garo, *Khowsay*, *ping*, Beiar, *Bhad-koi*, Bombay, *Karakā*, Tel., *Wel-shaw*, Burm., *Beida*, And.  
A moderate-sized tree. Bark grey. Wood grey, very soft. Structure similar to that of *S. wrens*, but medullary rays broader and shorter, and transverse bars distinct.

Sub-Himalayan tract from the Jumna eastwards, Central and South India, Burma and the Andaman Islands.  
Growth fast, 3 to 4 rings per inch of radius. Weight, 24 lbs per cubic foot  
Bark used in rope making. Fine specimens of the fibre were sent from Beitar to the Paris Exhibition of 1878 (C 985 Barragath Keeserve, Melpat)  
lbs  
24  
E 1394 Chittagong

## 2 HERITIERA, Blume.

Contains 3 Indian trees, of which 2 are here described. They have simple leaves, scaly beneath or silvery white. Besides the two here described, *H. Komor*, Buch, Hook Fl. Ind. i. 363 (*H. minor*, Roxb Fl. Ind. in 147, Kurz i. 141) is a tree of Sylhet Chittagong Arakan and the deltas of the Ganges and Irrawaddy. It has a red brown, strong wood, weighing 66 lbs per cubic foot, and used for boats, bridges and house building.  
Heartwood red, very hard. Numerous transverse bars between the medullary rays.

1. *H. littoralis*, Dryand, Hook. Fl. Ind. i. 363, Roxb Fl. Ind. in 142, Beddome xxxii, Kurz i. 140. Vern. *Sunder*, *sunder*, Beng.; *Penglar-kamazo*, Burm., *Maulda*, And.  
A small gregarious evergreen tree. Bark dark grey, with longitudinal cracks. Sapwood white, heartwood dark red, very hard, close-grained. Pores moderate-sized to large, often oval and subdivided into compartments. Medullary rays uniform, moderately broad, short, wavy, with numerous, very fine, white, transverse bars, the distance between two rays being generally equal to the transverse diameter of the pores.  
Coasts and tidal forests of Bengal, the Peninsula, Burma and the Andaman Islands.  
Weight, as much as 101 lbs when wet, according to Schlich. The weight of seasoned wood, as well as the value of it, have been determined by the following

The wood is generally light, soft, often spongy, with large pores and moderately broad or broad medullary rays, which are very prominent on a radial section.

1

l. S. wrens, Rorb. Fl. Ind. iii. 145; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 33; Kurz i. 135. Vern. *Gulu, kulū, gular, tabā, tannuku, karvā, Hind.; Olla, hatchanda, Ass.; Tabā, Tel.; Vellay putāli, Tam.; Karu, Ajmere; Kalauri, Panch Mebā.*

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, very smooth, white or greenish grey, exfoliating in large thin irregular plates. Wood very soft, reddish brown with an unpleasant smell, with lighter coloured sapwood. Prominent and regular concentric lines, which may possibly be annual rings. Pores large, often oval and subdivided, frequently filled with gum. Medullary rays moderately broad, on a radial section prominent as long, dark, undulating bands, giving the wood a mottled and reticulate appearance; the distance between the rays is larger than the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges eastwards, Southern India and Burma. Weight, about 42 lbs. per cubic foot; Kyd gives for Assam wood: Weight 18 lbs., P = 103, but it seems probable that Kyd's specimen was not this, but *S. villosa*. Wood used to make native guitars and toys. It yields a gum called '*Katila*' or '*Katwa*.' The seeds are roasted and eaten by Gonds and Kuriks in the Central Provinces. Its bark gives a good fibre, and fine specimens of it from Berar were sent to the Paris Exhibition of 1878 (C. 984 from Bhatnagar Reserve, Meghalat).

P	471.	Ajmere	.	.	.
F	3220.	Nagpahar, Ajmere	.	.	.
C	1102.	Ahri, Central Provinces	.	.	.
D	1088.	Madura, Madras	.	.	.

## 2. S.

2. *S. villosa*, Roxb. Fl. Ind. iii. 153; Hook. Fl. Ind. i. 355; Beddome xxxii; Brandis 32; Kurz i. 136; Gamble 10. Vern. *Poshwa*, Sutej; *Udal*, *ndar*, Hind.; *Gul-bodla*, *gul-kandar*, *massu*, Punjab; *Kanhllyem*, Lepcha; *Kidar*, *baringa*, Gondi; *Buti*, Kurku; *Omak*, *odela*, *sala*, Ass.; *Udare*, Garo; *Take nar*, *ari*, *ani-nar*, Tam.; *Sambering*, Magb. A moderate-sized tree. Bark grey or brown. Wood grey, very soft, spongy. Annual rings prominent. Pores large, often subdivided. Medullary rays moderately broad, harder than the white spongy tissue between them, joined by numerous transverse bars. On a radial section the pores and medullary rays are distinctly visible, giving the wood a reticulate and mottled appearance.

Sub-Himalayan tract from the Indus eastwards; common in forests throughout India and Burma. Growth fast, 3 to 6 rings per inch of radius. Weight, 15 to 22 lbs. per cubic foot. Wood not used. The tree is valuable on account of its fibre, which is coarse but strong. It is made into ropes and coarse bags, and in Bengal, Burma and South India into ropes and breastbands for dragging timber. Specimens were sent to the Paris Exhibition of 1878 from many provinces, but especially from Bengal and from Berar (C 986, for Baitargah Reserve, Melghat). It gives a white pellucid gum which exudes copiously from cuts in the bark. It coppices freely, and is extremely difficult to extricate in clearings.

clearings.

[illegible]

**3 S coccinea**, Roxb Fl Ind iii 151, Hook Fl Ind i 357, Kurz i 137, Gamble II Vern *Sitlo udal*, Nep, *Katior*, Lepcha. A small evergreen tree, with smooth, light grey bark, Wood grey, spongy, extremely soft. Structure similar to that of *S urens*. Transverse bars distinct.

**Eastern Himalaya** ascending to 6000 feet Assam Khasia Hills, hills of Burma.

We gth. 17 lbs per cubic foot.

Bark used for the same purposes as that of *S villosa* but less commonly.

**E 578 Khowlong Forest Darjeeling Terai** 17 lbs

**4 S colorata**, Roxb Fl Ind iii 146, Hook Fl Ind i 359, Beddome xxii, Bran 134, Kurz i 138, Gamble II Vern *Badula*, *Walena samarti*, Hind, *Moola*, Beng, *Sitlo udal*, *phirphiri*, *omra*, Nep, *Kanhljem*, Lepcha, *Bola-ong*, Garo, *Khowsey*, piny, Bear, *Bhai kot*, Bombay, *Karak*, Tel, *Wel shaw*, Burm, *Berd*, And. A moderate sized tree. Bark grey, Wood grey, very soft. Structure similar to that of *S urens*, but medullary rays broader and shorter, and transverse bars distinct.

**Central and South India, Burma**

eight 24 lbs per cubic foot  
the fibre were sent from Berar to  
erve Melghat)

**E 1394 Chittagong** 24 lbs

2 CHRITIERA Blume

Contains 3 Indian trees of which 2 are here described. They have simple leaves scaly beneath or silvery white. Besides the two here described *H Kon* Buch Hook Fl Ind i 363 (*H minor* Roxb Fl Ind iii 142 Kurz i 141) is a tree of Sylhet Chittagong Aracan and the deltas of the Ganges and Irrawaddy. It has a red brown strong wood weighing 66 lbs per cubic foot and used for boats, bridges and house building.

**Heartwood red very hard** Numerous transverse bars between the medullary rays

**1 H littoralis**, Dryand, Hook Fl Ind i 363, Roxb Fl Ind iii 142, Beddome xxii, Kurz i 140 Vern *Sunder*, *sunder*, Beng, *Penglat kanazo*, Burm, *Wald*, And. A small greenish evergreen tree. Bark dark grey, with longitudinal cracks. Sapwood white, heartwood dark red, very hard, close-grained. Pores moderate sized to large, often oval and subdivided into compartments. Medullary rays uniform, moderately broad, short, wavy, with numerous, very fine, white, transverse bars, the distance between two rays being generally equal to the transverse diameter of the pores.

**Coasts and tidal forests of Bengal, the Peninsula, Burma and the Andaman Islands**

Weight as much as 101 lbs when wet according to which The weight of seasoned wood as well as the value of it, have been determined by the following

experiments which show that the weight may be tolerably correctly taken at 65 lbs. and the value of P at 850 :—

Experiment by whom made.	Year.	Wood whence procured.	Number of experiments.	Size of bar.	Weight.	Value of P.
Brands	1861	Bengal	0	6 × 2 × 2	62	860
"	1865-6	"	1	6 × 2 × 1½	63	827
"	1862	"	6	6 × 1 × 2	65	783
Skinner, No. 79	1862	Burma	6	3 × 1 × 1	66	1,238
Kid Campbell	1831	Burma	1	2 × 1 × 1	67	816
Baker	1829	Bengal (seasoned)	2	6 × 2 × 2	67.5	1,038
"	"	Bengal (unseasoned)	2	6 × 2 × 2	68	744
"	"	" (5 years old)	6	6 × 2 × 2	69	891
"	"	" (1 year old)	1	6 × 2 × 2	69	839
"	"	"	9	3 × 1 × 1	69	849
Wallich	"	India	10	7 × 2 × 2	68	808
Smythes	1878	Different places	6	7 × 2 × 2	65	843

Sundri wood is durable; it is heavy and does not float, and is extremely tough. It is used for a great variety of purposes, such as beams, buggy shafts, plankings, posts, furniture, firewood; but chiefly in boat-building, for which purpose it is very extensively used in Calcutta, and particularly in the Government Dockyard at Kidderpore. On all lands flooded by ordinary flood-tides, a new growth of jungle springs up immediately; but on land ordinarily above high-water mark, it only establishes itself by slow degrees. It soon spreads itself on newly formed islands on the sea edge of the forests. "The roots of the Sundri do not penetrate deep into the ground, but spread laterally from 3 to 15 inches in height all round the parent stem; and when there are many trees close together, walking through a Sundri forest is very much like finding one's way among a fine growth of inverted tent pegs."—*Home*, in "*Bengal Forest Report*, 1873-74, *paragaph 13*," which, as well as Dr. Schlieh's article in the "*Indian Forester*," Vol. i, p. 6, may be referred to for further details about Sundri. The Sundri forests are generally very well stocked. Valuations made by Home in 1873-74 gave, for the average amount of material per acre of Sundri forest,—

Seedlings and saplings under 3 feet girth

Trees above 3 feet girth

2. H. Papiho, Beddome t. 218; Hook. Fl. Ind. i. 363. Vern.

*Soundalay annu*, Tinnevely.

A very lofty tree. Wood red, very hard, structure similar to that of *H. littoralis*, but pores less numerous and smaller, and transverse bars more numerous and more prominent.

Evergreen forests of the Western Ghats between Travancore and Tinnevely. Weight, 63 lbs. per cubic foot. Wood used for building, cart poles and agricultural implements.



2. *E. Hookeriana*, W. and A.; Hook. Pl. Ind. i. 370; Beddome xxxv; Brandis 36. Vern. *Nar-bokku*, Tel.; *Arang*, Berar; *Kutki*, *blunder*, Gondi. A small tree. Bark grey. Wood light red. Annual rings marked by an almost continuous line of pores. Pores small and moderate-sized,

often subdivided, enclosed in rings of soft texture. Medullary rays moderate-sized, wavy. Structure similar to that of the wood of *Kydia calycina*, but transverse bars wanting.

Central and Southern India

Each of radius The bark  
Exhibition of 1878 from

C 3791 Chanda, Central Provinces

3. E. Candolle, Wall, Hook. Fl. Ind. 1. 370, Kuiz 1 148.

Vern *Dhanea*, Burma

A deciduous tree, with grey bark. Heartwood brick-red, with orange and brown streaks, old pieces, however, losing their bright colour, hard, close-grained, shining, takes a beautiful polish, seasons well. Pores round, moderate-sized, in narrow rings of white tissue, prominent on a vertical section. Medullary rays numerous, white, prominent, fine and moderately broad. Annual rings marked by sharp concentric lines. Pores frequently arranged in concentric lines, and sometimes joined by narrow, wavy, concentric bands of soft tissue.

Burma.

Weight, according to Kurz 47, according to Brandis experiments 48 lbs, our specimens average 61 lbs. According to Brandis four experiments made in 1864, with bars  $3 \times 1 \times 1$  the value of P is = 1030 which shows great transverse strength and is well worthy of attention.

B 286	Burma (1867)	B 55
B 336	"	B 64
B 1450	"	B 63
B 2512	(1862)	B 41

E 1951 (46 lbs) is a wood received from Chittagong under the name *Mossé*. It is soft, reddish grey, with a small darker heartwood, splits and warps. Pores moderate sized, subdivided often in short radial strings. Medullary rays short moderately broad, joined by innumerable transverse bars. In structure the wood resembles that of *E. Candollei*, but the specimens of leaves which accompanied the wood sent belonged to *Brownlowia elata*, Roxb., a Tiliaceous tree. The wood, however, has no resemblance to that of any of the latter family.

# ORDER XIX TILIACEÆ

Contains 11 Indian genera. Of these, 9 are trees, shrubs or climbers, and 2 *Cochlosorus* and *Trunffella*, herbs or undershrubs. The Order is divided into 1 Tribes,

- Tribo I — Brownlowiæ
- " II — Grewiæ . . . . .
- " III — Tiliæ . . . . .
- " IV — Heteropetalæ . . . . .
- Brownlowia*, *Entace* and *Merrya* . . . . .
- Grewia* *Columbia*, *Trunffella* . . . . .
- Cochlosorus* and *Plagio-* . . . . .
- dicron* . . . . .
- Elchnocarpus* and *Elino-* . . . . .
- carpus* . . . . .

*Brownlowia* contains 3 species: *B. elata*, Roxb.; Hook. Fl. Ind. i. 381; Kurz i. 153 (*Huneia elata*, Roxb. Fl. Ind. ii. 640.) Vern. *Masyot*, a lofty tree of the tidal forests of Chittagong and Tenasserim (see p. 51, under *Eriolena* in Sterculiaceae No. E 1951); *B. lanceolata*, Bth.; Hook. Fl. Ind. i. 381, of the tidal forests of the Sundarbans, Aracan and Tenasserim, and *B. peltata*, Bth.; Kurz i. 153 of Tenasserim. *Columba* includes two shrubs of Burma. *Eriocarpus Nimmoanus*, Griseb.; Hook. Fl. Ind. i. 394; Beddome t. 110. Vern. *Chowya, yangli bendi*, Kan., is a fibrous barked tree of the western coast, and *Plagiophteron fraxinus*, Griff.; Hook. Fl. Ind. i. 399, a climbing shrub of Mergui. To the genus *Corchorus* belongs the Jute Plant, *C. capsularis*, Lam.; Vern. *Fat*, Beng., now extensively grown in and exported from Bengal; and other species, all of which yield fibres. Several species of *Triumfetta* also yield fibres, e. g., *T. angulata*, Lam. (*T. rhomboides*, Jacq.; Fl. Ind. i. 395.) Vern. *Chakki*, Hind., of which fine specimens were sent from Berar to the Paris Exhibition (C. 988. Bairagarr Reserve, Meighat). *Tilia europaea*, L., the Lime Tree or Linden of Europe, belongs to this Order.

The wood of Tiliaceae is marked by numerous, uniformly distributed, small or moderate-sized pores, and fine, equidistant, medullary rays.

1. PENTACE, Hassk.

1. *P. burmanica*, Kurz; Hook. Fl. Ind. i. 381; Kurz i. 154. Vern. *Thilka, kathika*, Burm.

A very large, tall tree. Wood yellowish red, shining, soft, even-grained, takes a good polish. Pores moderate-sized, often oval and subdivided into compartments, numerous, uniformly distributed. Medullary rays moderately broad, wavy, red, visible on a radial section, equidistant; the distance between the rays generally equal to the transverse diameter of the pores. Annual rings visible.

Burma. Growth rapid, 3 to 4 rings per inch of radius. Weight, 42 lbs. on an average. Now very largely used in Burma for boats, boxes and other purposes for which a light wood is required. Large quantities are annually exported, and though a few years ago the wood was quite unknown, it is now well known, even in European markets.

B 281.	Burma (1867)	.	.	.	.	.	.	.	.	.	.	42
B 802.	Tharawaddi. Burma	.	.	.	.	.	.	.	.	.	.	41
B 815.	Rangoon	"	.	.	.	.	.	.	.	.	.	43
B 1386.	Moulmein	"	.	.	.	.	.	.	.	.	.	41
B 3119.	Burma (1862)	.	.	.	.	.	.	.	.	.	.	42

2. BERBRYA, Roxb.

1. *B. Ammonilla*, Roxb. Fl. Ind. ii. 639; Hook. Fl. Ind. i. 383; Beddome t. 58; Kurz i. 155. The Trincomali Wood. Vern. *Peticoon*, Burm.; *Halimilla*, Cingh. (whence the specific name). A large tree with thin bark. Heartwood dark red, very hard, close-grained, but apt to split; it has, even when old, a smooth, rather damp feel. Pores small, oval, subdivided, enclosed in white patches, which are united by narrow undulating bands of soft tissue. Medullary rays prominent, numerous, uniform and equidistant; the distance between the rays equal to the transverse diameter of the pores.

South India, Burma and Ceylon.



The Weight and Transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured	Number of experiments	Size of scantling	Weight.	Value of P
Brands	1864	Burma	7	$\left\{ \begin{array}{l} 2 \times 1 \times 1 \\ 3 \times 1 \times 1 \\ 4 \times 1 \times 1 \end{array} \right.$	64	625
" No 8	1862	"	"	2 x 1 x 1	66 62	971
Puckle	"	Myore	3	2 x 1 x 1	60	784
Skinner No 23	1863	Ceylon	"	Various	63	1 012
" No 31	"	"	"	"	60	784
Car Exp 1862	"	"	"	3 x 1 1/2 x 1 1/2	60	622-1023
Daker	1829	"	3	6 x 2 x 2	61	700
A Mendes No 33	"	"	"	2 x 1 x 1	48	644
Emylics	1873	Burma	6	"	61	"

Benson's *Byltonia*, weighing 72 lbs is probably this. The wood is very durable No 8 2722 had been 50 years in Calcutta and was perfectly sound and good on being cut into. It is used for carts agricultural implements and spear handles, and in Madras for mastaba boats, and is much esteemed for toughness and flexibility

B 288	Burma (1867)	58
B 327	(1866)	61
B 1420	Tarawadi Burma	62
B 1452	Prome, Burma	65
B 2723	Tavoy (Wallich, 1828)	63
B 3118	Burma (1862)	65

### 3 GREWIA, Linn.

A large genus containing about 30 Indian trees and shrubs distributed all over India, except in the inner arid Himalaya. *G oppositifolia* is found as high up as 6000 feet in the North West Himalaya. There are 12 species in North West and Central India 8 in the North-East 17 in South India and 10 in Burma. The genus contains 3 sections of which the first, *Grewia*, contains the majority of species. The second, *Omphacarpus*, contains only one species *G calophylla* Kurz 157 Vern *Mayabo*, Burma a small evergreen tree of the coast forests of the Andaman. The third *Microros* contains two species *G sinuata* Wall. Hook Fl Ind 1 302, Kurz 158 a large and *G Microros*, Linn, Hook Fl Ind 1

The fruit is eaten and the inner bark made into cordage. Fine specimens of this were sent from Berar for the Paris Exhibition of 1878 (C 983 Bauragurh Reserve Melghat)

	lbs
C 189 Mandla Central Provinces (1871)	48
C 1169 Ahiri Reserve Central Provinces	46
C 2757 Moharh Reserve Central Provinces	53
C 2766 Melghat Berar	
C 1253 Gumsui Madras	49
No 17 Ceylon Collection	44

4 *G salvifolia*, Heyne, Hook Fl Ind 1 386, Beddome xxxvii, Brandis 43 Vern *Bather, nikki behkar, gaigas*, Pb, *Saras*, Ajmere, *Jara*, Circars

A small tree, with dark coloured bark. Wood yellow heartwood orange brown, hard, close grained, structure similar to that of *G tiliifolia*, but medullary rays more numerous and pores smaller. Annual rings well marked by a line of larger pores.

Punjab Sind Central Provinces and Southern India

Growth slow. Fruit small edible

P 3227 Nagpahar Ajmere	—
P 3237 Goran Hills Ajmere	

5 *G vestita*, Wall, Brandis 40, Gamble 12 *G elastica*, Royle, Kurz 1 160 *G asiatica*, Linn var, Hook Fl Ind 1 387 Vern *Farrī, phalwa, dhamman*, Pb, *Pharsia, dhamun, bimla* Hind, *Poto dhamun*, Palimow, *Sealposra*, Nep, *Kunsung*, Lepcha, *Pintaya*, Burm

A small tree, with grey or brown bark. Wood greyish white, hard and close grained. Annual rings wavy. Pores moderate sized. Medullary rays fine and moderately broad, numerous, prominently marked on a radial section, and giving the wood a beautiful silver grain.

Sub Himalayan tract from the Indus eastwards Bengal Central India and Burna

Growth moderately slow 5 to 7 rings per inch of radius. Weight our specimens 60 lbs. Wood tough and elastic. Splits well and is sometimes used

	lbs
E 651 Bamanpokri Darjeeling Terai	43
E 2325	51
B 3120 Burma (1862)	51

6 *G asiatica*, Linn, Hook Fl Ind 1 386, Roxb Fl Ind 11 586, Beddome xxxvii, Brandis 40, Kurz 1 161. Vern *Phalsa*, Hind, *Dhamni*, Ajmere

A small tree. Bark rough, grey. Wood yellowish white, structure similar to that of *G vestita*

Wild in Central India and Rajputana. Cultivated throughout India for its fruit. Bark used in rope making.

P 170 Ajmere	—
P 3218 Nagpahar Ajmere	—
P 3235 Goran Hills Ajmere	

7 *G multiflora*, Juss, Hook Fl Ind 1 388, Gamble 12 *G sepia-aria*, Roxb Fl Ind 11 589, Brandis 42 Vern *Pansaura*, Hind, Beng, *Aslay*, Nep

A shrub or small tree. Bark brown. Wood white, soft, similar in structure to that of *G oppositifolia*, but with smaller pores.

*bhewal*, *bhimúl*, *kakki*, Hind.; *Alpeyar*, Tel.; *Dansagla*, Lepcha, is a small tree of the outer Himalaya, from the Jumna eastwards, Assam, Central and Southern India and Burma, recognized by its long, tapering, glabrescent leaves; while *G. abutilifolia*, Juss.; Hook. Fl. Ind. i. 330; Beddome xxxvii (*G. aspera*, Roxb. Fl. Ind. ii. 591) Vern. *Pedda taraki*, Tel., is a small tree found in Southern India. Some species of *Grewia* have edible fruits, and the wood of some is strong, tough and elastic.

The wood of *Grewia* has small or moderate-sized pores, uniformly distributed, and numerous fine, rarely moderately broad medullary rays. The annual rings are generally marked.

1. *G. oppositifolia*, Roxb. Fl. Ind. ii. 583; Hook. Fl. Ind. i. 384; Brandis 537. Vern. *Dhamman*, *pharwa*, Pb.; *Biúl*, *biúng*, *bahúl*, *bhimal*, *bhengal*, Hind.; *Bieul*, Simla; *Pasturwanne*, Afg.

A moderate-sized tree, with grey bark. Wood white, with a small mass of irregularly-shaped heartwood, hard, giving out an exceedingly unpleasant odour, especially when fresh cut. Annual rings marked by white lines. Pores moderate-sized, very numerous, uniformly distributed. Medullary rays fine, white, wavy, very numerous.

North-West Himalaya, from the Indus to Nepal, ascending to 6,000 feet.

Growth moderate, 7 rings per inch of radius. Weight, 45 to 50 lbs. per cubic foot. The wood is used for oar-shafts, handles, bows, &c., and for most purposes for which elasticity and toughness are required. The bark gives a fibre which is much used in the Punjab for rope and paper-making, but is not durable. The tree is much lopped for feeding cattle during the winter.

H 100.	Bhajji, Simla, 4,000 feet	.	.	.	.	.	.	lbs.
H 154.	Sainj, „ 3,000 „	.	.	.	.	.	.	45
								50

2. *G. populifolia*, Vahl.; Hook. Fl. Ind. i. 385; Brandis 38. Vern. *Ganger*, Pb.; *Gango*, Sind; *Gangerun*, Rajputana.

A small shrub, with grey bark. Wood yellow, hard, close-grained. Annual rings marked by an almost continuous line of slightly larger pores. Pores small, numerous, uniformly distributed. Medullary rays very fine, white, wavy, very numerous.

Arid zone, in the Punjab, Sind and Rajputana.

Growth very slow. The wood is used for walking sticks and the fruit is eaten.

P 3228. Nagpahar, Ajmere . . . . .

3. *G. tiliaefolia*, Vahl.; Hook. Fl. Ind. i. 386; Roxb. Fl. Ind. ii. 587; Beddome t. 108; Brandis 41; Kurz i. 161. Vern. *Pharsa*, *dhamin*, Hind.; *Khesla*, *kasúl*, Gondi; *Dhamni*, Kurku; *Charachi*, *tharrá*, Tel.; *Dhamono*, Uriya; *Thadsal*, *batala*, Kan.; *Damnak*, Bhíl; *Daman*, Mar.; *Sadachu*, Mal.; *Daminne*, Cingh.

A moderate-sized tree. Bark  $\frac{1}{8}$  inch thick, grey on young trees, dark brown on old trees. Sapwood white; heartwood small, brown, close-grained, hard. Annual rings visible. Pores moderate-sized, numerous, uniformly distributed; a continuous belt of pores in the spring wood; autumn wood harder. Medullary rays fine, prominent on a radial section, giving a handsome silver grain; the distance between the rays equal to the transverse diameter of the pores.

Sub-Himalayan tract from the Jumna to Nepal, ascending to 4,000 feet; Central and South India.

Growth moderate, about 6 rings per inch of radius. Weight, according to Skinner No. 75, 34 lbs.; Brandis says 30 to 40 lbs.; the average of those examined gave 48 lbs. Skinner's experiments in South India gave  $P = 565$ . Used for shafts, shoulder poles, masts, oars and all purposes for which elasticity, strength and toughness are required.

The fruit is eaten and the inner bark made into cordage. Fine specimens of this were sent from Berar for the Paris Exhibition of 1878 (C 983 Bairagarh Reserve Melghát)

C 188	Mandla Central Provinces (1871)	lbs 48
C 1169	Ahiri Reserve Central Provinces	46
C 2707	Moharh Peserve Central Provinces	53
C 2766	Melghat Berar	
C 1203	Gumsu Madras	49
No 17	Ceylon Collection	44

4 *G. salvifolia*, Heyne, Hook Fl Ind 1 386, Beddome xxxvii, Brandis 43. Vern *Baithi*, *nikki-bekkar*, *gaigas*, Pb, *Saras*, Ajmere, *Jara*, Circars

A small tree, with dark coloured bark. Wood yellow, heartwood orange brown, hard, close grained, structure similar to that of *G. tiliifolia*, but medullary rays more numerous and pores smaller. Annual rings well marked by a line of larger pores.

Punjab Sind Central Provinces and Southern India  
Growth slow. Fruit small edible.

P 3227 Nagpahar Ajmere

P 3237 Goran Hills Ajmere

5 *G. vestita*, Wall, Brandis 40, Gamble 12. *G. elastica*, Royle, Kurz 1 160. *G. asiatica*, Linn var, Hook Fl Ind 1 387. Vern *Fairi*, *phalwa*, *dhamman*, Pb, *Pharsia*, *dhamun*, *bimla*, Hind, *Poto dhamun*, Palamow, *Sealposra*, Nep, *Kunsung*, Lepcha, *Pintayan*, Burm.

A small tree, with grey or brown bark. Wood greyish white, hard and close grained. Annual rings wavy. Pores moderate sized. Medullary rays fine and moderately broad, numerous, prominently marked on a radial section, and giving the wood a beautiful silver grain.

Sub-Himalayan tract from the Indus eastwards. Bengal Central India and Burm.

Growth moderately slow. 5 to 7 rings per inch of radius. Weight our specimens  
ays 50 lbs. Wood tough and elastic.  
Splits well and is sometimes used.

E 601	Bamunpokri Darjeeling Terai	lbs 43
L 2320		51
B 3120	Burma (1862)	51

6 *G. asiatica*, Linn, Hook Fl Ind 1 386, Roxb Fl Ind ii 586, Beddome xxxvii, Brandis 40, Kurz 1 161. Vern *Phalsa*, Hind, *Dhamu*, Ajmere.

A small tree. Bark rough, grey. Wood yellowish white, structure similar to that of *G. vestita*.

Cultivated throughout India for its fruit.

1 3010 Nagpahar Ajmere

P 3235 Goran Hills Ajmere

7 *G. multiflora*, Juss, Hook Fl Ind 1 388, Gamble 12. *G. septaria*, Roxb Fl Ind ii 589, Brandis 42. Vern *Pansaura*, Hind, Beng, *Aslay*, Nep.

A shrub or small tree. Bark brown. Wood white, soft, similar in structure to that of *G. oppositifolia*, but with smaller pores.

Outer Himalaya from Nepal eastwards, ascending to 4,000 feet, Khasia Hills. Used in Bengal for making hedges, for which it is very useful.

E 2327. Siroke, Darjeeling Terai . . . . . lbs.  
42

8. *G. pilosa*, Lam.; Hook. Fl. Ind. i. 388; Brandis 39. *G. carpinifolia*, Roxb. Fl. Ind. ii. 587. Vern. *Posangni*, Ajmere.

A shrub with four-angled stem and brown bark. Wood yellowish white, hard, divided into triangular wedges proceeding from the centre towards the four corners and sides, the annual rings in the wedges towards the corners marked by large pores, those towards the sides by a white line and a few moderately large pores. Pores in the rest of the wood small. Medullary rays fine, white, numerous.

Plains of the North-West, Central and South India.

P 3230. Nagpahar, Ajmere . . . . .  
P 3256. Goran Hills, Ajmere . . . . .

#### 4. ECHINOCARPUS, Blume.

Contains 5 large trees of the forests of the north-east and east moist zone in Sikkim, Bhutan, Assam, the Khasia Hills and Burma. *E. sterculiaceus*, Bth.; Hook. Fl. Ind. i. 400; Gamble 12. Vern. *Banj*, Nep.; *Thabola*, Māgh, is a very large tree of the Sikkim Terai. Chittagong and Burma, with a deeply buttressed trunk and large fruit covered with long needle-like spines. *E. tomentosus*, Bth.; Hook. Fl. Ind. i. 400; Gamble 12. Vern. *Kaktay*, Nep.; *Taksor*, Lepcha, is a large tree of the Sikkim Hills from 2,000 to 4,000 feet. *E. Murex*, Bth.; Hook. Fl. Ind. i. 399, is a large tree of the Khasia Hills and Burma (*E. Sigun*, Bl.; Kurz i. 162); and *E. assamicus* Bth.; Hook. Fl. Ind. i. 399. Vern. *Jubba hingori*, Ass., a tree of Upper Assam, whose wood, according to Mr. Mann, is used for planking.

1. *E. dasycarpus*, Bth.; Hook. Fl. Ind. i. 400; Gamble 12. Vern. *Gobria*, Nep.

A large tree. Bark dark grey. Wood greyish brown, soft. Pores small. Medullary rays fine and moderately broad, closely packed, straight, prominent on a radial section.

Eastern Himalaya, 5,000 to 7,000 feet. (Hooker, in Fl. Ind., says: "Sikkim at 2,000 feet," but I have never seen it below 5,000 feet.—J. S. G.)

Weight, 32lbs. per cubic foot. Used for planking, for tea-boxes and to make charcoal. It is in considerable demand in Darjeeling. The tree is very handsome, as it has showy clusters of yellow-white flowers, capsular fruit, with short close-set spines, black seeds with a red arillus, and drooping branches. It flowers and seeds freely each year, and seedlings come up well.

E. 694. Chuttockpur, Darjeeling, 6,000 feet . . . . . lbs.  
32

E. 1289 sent from Cachar under the name '*Sitarjat*' has a similar structure, but the pores are larger. This is probably *E. tiliaceus* of Mr. G. Mann's Assam Lists (*Phul hingori*, Ass.; *Sitarsaaz*, Cachar), Assam Forest Reports, 1874-75 and 1875-76. Said by Mr. Mann to be used for planks and beams where not exposed to changes of weather.

#### 5. ELÆOCARPUS, Linn.

A large genus of trees, chiefly found in the moister parts of India; 25 species are found in India, of which the distribution is:—

North-Western India . . . . .	1
North-Eastern India . . . . .	14
Burma . . . . .	17
Central India . . . . .	1
Southern India . . . . .	14

The genus is divided into three sections

Section I *Gantrus* contains *E Gantrus* Roxb Fl Ind ii 592, Hook Fl Ind i 400 Beddome xxxvii Brandis 43, Kurz i 168 Vern *Rudrak* Hind a large tree of North Eastern and Central India the hard tubercled nuts of which are polished and made into rosaries and bracelets

Section II *Dicera* contains besides the two species described below *E serratus* Lun Hook Fl Ind i 401 Beddome xxxviii Vern *Jalpai*, Beng *Perunkdra* Kan *Wiralu* Cingh a tree with edible fruit of Bengal the North East Himalaya and the Western Coast (Weight 33lbs Wallich) *E floribundus* Bl Hook Fl Ind i 401, Kurz i 167 of Eastern Bengal and Burma *E oblongus* Gaertn, Beddome xxxviii Vern *Bikk* Nilgiris of Southern India with a strong white tough wood and several other less common species

Section III *Monocera* contains *E tuberculatus* Roxb Fl Ind ii 594 Beddome

and Chittagong besides other species

The species of *Flæocarpus* have usually handsome flowers with lacinate petals, and the fruits of most species resemble an olive and are eaten

1 *E robustus*, Bl, Hook Fl Ind i 402, Roxb Fl Ind ii 597, Kurz i 169, Gamble 13 Vern *Jalpai*, Sylhet, *Bepari*, *batrachi*, Nep, *Chekio*, Magh, *Taumagye*, Burm

An evergreen tree Wood white, shining, soft, even grained Annual rings marked by a prominent line Pores moderate sized, uniformly distributed, generally oval or elongated, subdivided Medullary rays fine and very fine, closely packed, visible as long narrow bands on a radial section

Eastern Himalaya ascending to 2000 feet, Khasia Hills Eastern Bengal, Chittagong Burma and Andaman Islands

Growth moderate Weight 38lbs per cubic foot

E 581 Khookloong Forest Darjeeling Terai

lbs.  
38

2 *E lanceæfolius*, Roxb Fl Ind ii 598, Hook Fl Ind i 402, Kurz i 167, Gamble 13 Vern *Bhadras*, *batrachi*, Nep, *Shephyew*, Lepcha, *Sakalang*, Ass

A large tree Wood soft light brown Pores small, in short strings of 2 to 5 Medullary rays extremely numerous, fine and very fine, appearing as narrow plates on a radial section.

Eastern Himalaya from 6000 to 8000 feet Khasia Hills Sylhet and Tenasserim Growth moderate, 8 rings per inch of radius Weight 41lbs Used for house-building tea-boxes and charcoal Fruit edible

E 358 Rangbul Darjeeling, 7000 feet

lbs  
41

## ORDER XX LINEÆ

A small Order containing 4 genera of Indian trees or shrubs The only one of any importance is *Erythroxylon Reinwardtia* contains 2 small yellow flowered under shrubs of the Himalaya, Eastern Bengal and the Western Ghats, *Hugonia Mystar*,

ORDER XXIII BUTACEÆ

my size, but generally shrubs or

Tribe I—Rutecæ

Only herbs such as the Garden Rue, and the *Bonninghausenia*, so common in Himalayan forests

*Rivdia*, *Melicope* and *Xanthoxylum*

*Toddalia*, *Acronychia* and *Skimmia*

*Glycosmis*, *Alvromelium*, *Murraya*, *Clausena*, *Triphasia*, *Limonia*, *Lansanga*, *Paraxipogon*, *Atalapha*, *Citrus*, *Feronia* and *Aegle*

*Melicope* contains two shrubs *M. indica* Wright Hook f. Ind. 1492 Beddome x1, of the higher ranges of the Nilgiri Hills and *M. Hefteri*, Hook f., of the Andaman Islands and Tenasserim *Acronychia laurifolia* Bl., Hook f. Ind. 1498, Kurz 1, 184, Gamble 14 (4 *pedunculata*, DC Beddome x11) Vern *Pawlay*, Nep, *Loagum*, Ass, is a small tree of the Sikkim Himalaya, Khasia Hills, Assam, Chittagong South India and Burma *Glycosmis pentaphylla* Correa, Hook f. Ind, 1499, Beddome x111, Brandis 49, Kurz 1 186, Gamble 14 Vern *Ban nambu*, *Lanshouk* Burma, is a tree, found in most part of Bl., Hook f. Ind. 1501,

which are *C. pentaphylla*, DC, Brandis 49 Vern *Kallangote*, *surymukha tegur*, Hind a deciduous shrub of the Sub Himalayan tract from the Jumna to Nepal and *C. Willdenowii*, W and A, Hoot f. Ind. 1506, Beddome x11, Gamble 15 Vern *Mor kurang*, Kadars, *Madanay* Nep, *Terhilyok edemnyok* Lepcha a small tree of the Sikkim Himalaya Western Ghats and Ceylon *Triphasia trifoliata* DC, Hook f. Ind 1507, Kurz 1 192 is a small spinous garden shrub of South India and Burma *Limonia* contains 1 shrubs of India and Burma, of which *L. acidissima*, Lam, Hook f. Ind. 1507, Beddome x1, Brandis 47 Kurz 1 192 (*L. crenulata*, Roxb *Burm* a spinous shrub of dry hills in various *Lansunga* obtained wood is the most common

It common is *P. monophylla*, e 15 Vern *Nakanta*, Nep, from Gil in down to Tenas *Arantium*, Lam Vern *Avarangi*, *Santala*, Nep, *Aitchi*, Tam, *Kittali*, Tel, 717), *C. medica* Lam the Citron, Lemon and *decumana*, Wild, the Shaddock or Pummelo

The Rutecæ have a very uniform structure The wood is close and even-grained, generally white, with a yellowish tinge The pores are small, uniformly distributed, with a tendency to form radial lines The medullary rays are fine, uniform and equidistant The wood of *Syminia* is anomalous, being distinguished by extremely small pores, arranged in oblique ways, and by very fine, very numerous medullary rays The wood of most species is marked by white concentric lines, which are generally at unequal distances and often run into each other

Limb; Hook. Fl. Ind. t. 413. is a rambling leafy shrub of Southern India; and  
*Arundinææ kusina*, Hook. f. & Hook. Fl. Ind. t. 416. a small tree of the Khasia  
 Hills. Many species give a strong fibre. *Tinnæ* is cultivated in India for its fibre and oil.

1. ERYTHROXYLON, Lindl.

Contains four Indian species. Besides the one described, *X. Kunthianum*, Wall.; Hook. Fl. Ind. i. 411; Kurz i. 171, is a shrub of Easter, Bengal, the Khasia Hills and Burma, above 3,000 feet elevation; and *X. burmannicum* Kurz i. 171, a tree of Burma and the Andaman Islands; a powerful stimulant of the nervous system, is the *X. Coca*.

1. *E. monogyneum*, Roxb. Fl. Ind. ii. 419; Hook. Fl. Ind. i. 414; Kurz i. 171. *E. indicum*, Beddome t. 81. *Sethia indica*, DC. Prodr. i. 576. Bastard Sandal. Vern. *Devadaru*, Tam.; *Adi*, Tel. A small tree. Sapwood white; heartwood dark brown, with a pleasant resinous smell; heartwood takes a beautiful polish. Pores very small, very numerous. Medullary rays short, very fine, uniformly distributed.

South India and Ceylon.  
Weight, 55 to 67 lbs. per cubic foot.  
Used as a substitute for sandalwood. The wood give  
is an oil used as a preservative  
lbs. for native boats.

	D 1083.	North Arcot	.	.	.	.	.	. D 2027. Mysore
	D 1091.	Mandura	.	.	.	.	.	.
67	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.
65	.	.	.	.	.	.	.	.
199.								

ORDER XXI. MALPIGHIACEAE.

An Order which is represented in India merely by two genera of climbing or straggling shrubs. *Hiptage Madabolata*, Gaertn.; *H. Roxb.* Fl. Ind. ii. 368. Vern. 44; Kurz i. 173; Gamble 13. (*Gaertnera racemosa* Kunth, Pb.; *Shempak*, Nep.; *Kampfi*, Madanul, Hind.; *Endra*, chopar, benkar, climbing shrub of most parts *Haladuwil*, Mar.; *Maddibullata*, Beng., is a common. Fl. Ind. i. 419; Kurz i. 174. Vern. *Dwunsookapan*, Burm.; and *H. obtusifolia*, DC. Wall.; Hook. Fl. Ind. i. 419, is a bushy shrub of the Khasia Hills; and *H. parvifolia*, W. and A.; Hook. Fl. Ind. i. 419, a shrub of Southern India and Ceylon; making 5 species. *Aspidopterys* contains 7 climbers, chiefly of the Himalaya, Southern India and Burma, but none of any special interest.

ORDER XXII. GERMANIA CEMENT.

[illegible]



ORDER XXIII. RUTACEÆ.

my size, but generally shrubs or

Tribe I—Rutaceæ

II—Xanthoxyleæ

III—Tolladaceæ

IV—Auranticeæ

Ericodia, Melicope and Xanthoxyleæ

Toddalia, Acronychia and Glycosmis, Litsea, Murraya, Clausena, Triphasia, Lumniza, Parantignya, Atilon, Citrus, Ecoria and Aegle-

Melicope contains two shrubs *M. indica*, Wright, Hook *Fl* Ind 1 492, Beddome

of the higher ranges of the Nilgiri Hills, and *M. Helstern*, Hook *f*, of the Andaman

Islands and Tenasserim. *Acronychia laurifolia*, Bl., Hook *Fl* Ind 1 498, Kurz

1 181, Gamble 11 (*A. pedunculata*, DC, Beddome xii) Vern *Poacalay*, Nep;

*Loagim*, Ass, is a small tree of the Sikkim Himalaya, Khasia Hills, Assam,

Chittagong, South India and Burma. *Glycosmis pentaphylla*, Correa, Hook *Fl* Ind,

1 499, Beddome xiii, Brandis 49, Kurz 1 186, Gamble 14 Vern *Ban nimbu*,

*potala*, *pitru potala*, *gurgilli*, Hind, *Kirmira*, Bombay, *Taushouk*, Burma, is a

common evergreen shrub, with very variable leaves and fruits, found in most part of

India. *Micromelum* contains 2 species *M. pubescens*, Bl., Hook *Fl* Ind 1 601;

Vern *Lasmant*, Nep, *Kamblong*, Lepcha; to Eastern Himalaya, Assam, Eastern Bengal,

*C. Willdenowii*, W., and

*Mor kuranji*, Kadars,

*Terhlingyok*, *sidemnyok*, Lepcha, a small tree of the Sikkim

Himalaya, Western Ghats and Ceylon. *Triphasia trifoliata*, DC, Hook *Fl* Ind

1 507, Kurz 1 192, is a small spinous garden shrub of South India and Burma.

*Limonia* contains 1 shrub of India and Burma, of which *L. acidissima*, Linn,

Hook *Fl* Ind 1 507, Beddome xiv, Brandis 47, Kurz 1 193 (*L. crenulata*, Roxb,

Burm a spinous shrub of dry hills in various parts of India, with a hard close-

wood of most species is marked by white concentric lines, which are

generally at unequal distances and often run into each other.

Contains four Indian species. Besides the one described, *E. Antillarum*, Wall.; Hook. Fl. Ind. i. 414; Kurz i. 171, is a shrub of Eastern Bengal, the Khasia Hills and Burma, above 3,000 feet elevation; and *E. burmanicum*, Gilg.; Hook. Fl. Ind. i. 414; Kurz i. 171, a tree of Burma and the Andaman Islands. The Coca or Spodie Plant of Peru, well known as a powerful stimulant of the nervous system, is the *E. Coca*.

1. *E. monogynum*, Roxb. Fl. Ind. ii. 449; Hook. Fl. Ind. i. 414; Kurz i. 171. *E. indicum*, Beddome t. 81. *Sethia indica*, DC. Prodr. i. 576. Bastard Sandal. Vern. *Devadaru*, Tam.; *Aditi gerenta*, Tel. A small tree. Sapwood white; heartwood dark brown, with a pleasant resinous smell, very hard, takes a beautiful polish. Pores very small, very numerous. Medullary rays short, very fine, uniformly distributed.

South India and Ceylon.  
Weight, 55 to 67 lbs. per cubic foot.  
Used as a substitute for sandalwood.  
The wood gives an oil used as a preservative  
for native boats.

D 1083.	North Arcot	.	.	.	.	.	.	.	.	.
D 1091.	Madurai	.	.	.	.	.	.	.	.	.
D 2027.	Mysore	.	.	.	.	.	.	.	.	.

An Order which is represented in India merely by two genera of climbing or strangling shrubs, *Hiptage Alabala*, Gaertn.; Hook. Fl. Ind. i. 418; Brandis 44; Kurz i. 173; Gamble 13. (*Gaetneria racemosa*, Roxb. Fl. Ind. i. 368) Vern. *Kampi*, *madmati*, Hind.; *Endur*, *chopar*, *benkar*, *kumb*, Pb.; *Shempati*, Nep.; *Haladwari*, Mar.; *Maddulali*, Beng., is a common climbing shrub of most parts of India and Burma; *H. candicans*, Hook. f.; Hook. Fl. Ind. i. 419; Kurz i. 174. Vern. *Youngsookupan*, Burma; and *H. obtusifolia*, DC.; Kurz i. 173 are respectively a large shrub and a climber of Burma; *H. acuminata*, Walp.; Hook. Fl. Ind. i. 419, is a bushy shrub of the Khasia Hills; and *H. parvifolia*, W. and A.; Hook. Fl. Ind. i. 419, a shrub of Southern India and Ceylon; making 5 species. *Aspidopterys* contains 7 climbers, chiefly of the Himalaya, Southern India and Burma, but none of any special interest.

A large Order, chiefly containing herbaceous plants, such as *Geranium*, *Oxalis* and *Impatiens*. Only one genus, *Aeschynom*, contains trees, and these introduced: *A. Carabolia*, Linn.; Hook. Fl. Ind. i. 439; Roxb. Pl. Ind. ii. 450; Beddome xxix.; Brandis 45; Kurz i. 177; Gamble 13. Vern. *Kamaranga*, Hind.; *Kamwng*, Beng.; *Soumyah*, Burm. is a small tree which is commonly cultivated in India and Burma for its fruit, which is eaten stewed or made into preserves. Home says it is used in the Sundarbans for building purposes and furniture. Skinner, No. 18, gives its weight as 40 lbs. per cubic foot, and 712 for the value of P; Wallich gives its weight as 40 lbs. Vern. *Bilimb*, Linn.; Hook. Pl. Ind. i. 439; Roxb. Pl. Ind. ii. 451; Beddome t. 117. *Bilimb*, *Bhimbu*, *anewla*, Hind., is a small tree cultivated and often found run wild in India. It has an acid fruit, which is pickled or preserved in sugar, and the juice is used in removing iron stains from linen.

ORDER XXIII RUTACEÆ

A large Order, containing however few trees of any size, but generally shrubs or climbers, which are aromatic with gland dotted leaves  
The Order is divided into 4 Tribes, viz —

Tribe I — Rutaceæ

“ II — Xanthoxyloideæ

“ III — Toddalideæ

“ IV — Aurantiaceæ

Only herbs such as the garden Rue, and the *Bonninghausenia*, so common in Himalayan forests  
*Evodia*, *Melicope* and *Xanthoxylum*  
*Toddalia* *Acronychia* and *Skimmia*  
*Glycosmis* *Microsolum*, *Murraya*, *Clausena*, *Tripkasia*, *Limonia*, *Lavanga*, *Parananga* *Alstonia*, *Citrus*, *Reynoua* and *Aegle*—

*Melicope* contains two shrubs *M. indica* Wright Hook f. Ind. 1492 Beddome of the higher ranges of the Nilgiri Hills and *M. Heister*, Hook f. of the Andaman Islands and Tenasserim *Acronychia laurifolia* Bl. Hook f. Ind. 1498, Kurz 184, Gamble 14 (4 *pedunculata*, DC, Beddome xlv) Vern *Paowlay*, Nep, *Jogjam*, Ass. is a small tree of the Sikhim Himalaya, Khasia Hills, Assam, Chittagong South India and Burma *Glycosmis pentaphylla* Correa, Hook. f. Ind. 1499, Beddome xlii, Brandis 49, Kurz 156 Gamble 14 Vern *Ban nimb*, *notali nitra notala viridis* Hind *Kurira* Bombay, *Lauson*, Burm. is a

tree, found in most part of BI, Hook f. Ind. 1501, Nep, *Kamburong*, Lepcha, Assam, Eastern Bengal, yellowish white wood, and 87 a small Burmese shrub which are *C. pentaphylla*, DC, Brandis 49 Vern *Kallangyote*, *curymbukha*, *teyner*, Hind a deciduous shrub of the Sub Himalayan tract from the Jumna to Nepal and *C. Willdenowii*, W and A, Hook f. Ind. 1506, Beddome xlv, Gamble 15 Vern *Mor kungu*, Kaders, *Madanay* Nep, *Tetralin* *sidemnyok* Lepcha a small tree of the Sikhim Himalaya Western Ghats and Ceylon *Tripkasia trisulata* DC, Hook f. Ind. 1507 Kurz 1592 is a small spinous garden shrub of South India and Burma *Limonia* contains 1 shrub of India and Burma of which *L. acidissima*, Linn, Hook f. Ind. 1507, Beddome xlv, Brandis 47 Kurz 1592 (*L. crenulata*, Roxb. f. Ind. 1581) Vern *Beli*, Hind, *Tor claga*, Tel, *Kawat* Mar, *Theekaya* = *Burm* a spinous shrub of dry hills in various parts of India, with a hard close-limbing shrub, one of Eastern *nigaya*, has 5 shrubs or climbers at common is *P. monophylla*, e 15 Vern *Nalakanta*, Nep, from Sikhim down to Tenas *translunum*, Linn Vern *Avartangi*, *naringi*, Hind, *Aumila nebu* Beng, *Suntala*, Nep, *Kitchi*, Tam, *Kittali*, Tel, 17), *C. medica* Linn the Citron, Lemon and *decumana* Wild, the Shaddock or Pummelo.

The Rutaceæ have a very uniform structure The wood is close and even-grained, generally white, with a yellowish tinge The pores are small, uniformly distributed, with a tendency to form radial lines The medullary rays are fine, uniform and equidistant. The wood of *Syzygium* is anomalous, being distinguished by extremely small pores, arranged in oblique wavy tails, and by very fine, very numerous medullary rays. The wood of most species is marked by white concentric lines, which are generally at unequal distances and often run into each other

1. *EVODIA*, Forst.

Contains 6 species of Indian small trees or shrubs. *E. viticina*, Wall.; Hook. Fl. Ind. i. 489; Kurz; i. 179, is a small tree of Tenasserim; *E. nutecarpa*, Hook. f. and Th., a small tree of the inner valleys of Sikkim, between 7,000 and 10,000 feet; and *E. melicifolia*, Bth., a small tree of Assam.

1. *E. fraxinifolia*, Hook. f.; Hook. Fl. Ind. i. 490; Gamble 13. Vern. *Kanukpa*, Nep.; *Kanu*, Lepcha.

A small tree. Bark smooth, light grey,  $\frac{1}{10}$  inch thick. Wood white, soft. Pores small, often subdivided, numerous near the inner edge of each annual ring. Medullary rays short, moderately broad.

Eastern Himalaya in Sikkim, between 4,000 and 7,000 feet, Khasia Hills from 3,000 to 6,000 feet. Growth fast, 4 to 6 rings per inch of radius. Weight, 21 lbs. per cubic foot. Wood used only for posts of huts. It comes up commonly in second growth forest, and the leaves, flowers and fruit when bruised, have a disagreeable aromatic smell.

E 3101. Drying, 7,000 feet

lbs.  
21

2. *E. Roxburghiana*, Benth.; Hook. Fl. Ind. i. 487; Kurz i. 180. *E. triphylla*, Beddome xli. *Agavea triphylla*, Roxb. Fl. Ind. i. 416. *Xanthoxylum triphyllum*, Thwaites Enum. 69. Vern. *Nebede*, *lunu-unkenwa*, Cingh.

A small tree. Wood greyish brown, moderately hard. Pores small, uniformly distributed. Medullary rays short, distant, fine to moderately broad.

Khasia Hills, South India and Ceylon, Tenasserim and the Andaman Islands.

Weight, 51 lbs., according to A. Mendis.

—No. 60. Ceylon Collection . . . . . lbs.  
51

B 1979 collected by Kurz in the Andamans in 1866 and marked *E. triphylla*, DC. (Hook. Fl. Ind. i. 488; Kurz i. 180), has a soft pale red wood, with moderate-sized, oval, elongated and subdivided pores, and very fine and closely packed medullary rays.

2. *XANTHOXYLUM*, Linn.

A genus containing 10 small, rarely large trees or straggling or climbing shrubs, most of them of very little importance. Besides the one described: *X. acanthopodium*, DC.; Hook. Fl. Ind. i. 493; Kurz i. 181; Gamble 14. Vern. *Bogay timur*, Nep., is a small tree of the outer Himalaya from Kumaun to Sikkim and the Khasia Hills, ascending to 7,000 feet; *X. Rhetsa*, DC.; Hook. Fl. Ind. i. 495, Beddome xli. (*Agavea Rhetsa*; Roxb. Fl. Ind. i. 417) Vern. *Rhetsa ndu*, Tel.; *Sessal*, Mar.; *Rattu kina*, Bingham, is a large tree of the Western and Eastern Ghats of South India; and *X. Budrunga*, DC.; Hook. Fl. Ind. i. 495; Kurz i. 182. Vern. *Boryonali*, Ass.; *Mayaning*, Burm., is a tree of Eastern Bengal, Chittagong and Burma, with a rather heavy, soft, yellowish white, close-grained wood. The rest are shrubs or climbers.

1 *X. alatum*, Roxb. Fl. Ind. iii. 768; Hook. Fl. Ind. i. 493; Beddome xlii.; Brandis 47; Gamble 14. Vern. *Timbur*, *timur*, *tezmal*, *dwimur*, Hind.; *Balay timur*, Nep.; *Sungwa*, Lepcha.

A shrub or small tree. Bark corky, young stems with thick conical prickles with a corky base. Wood close-grained, yellow. Pores small, often in radial lines, not uniformly distributed; belts with numerous pores often alternating with belts with scanty pores. Medullary rays fine, short, very numerous.

Outer Himalaya from the Indus to Bhutan, ascending to 7,000 feet, Khasia Hills.

taking tooth brushes Fruit to purify water The whole

H 107 Bhaji S mila 4 000 feet  
E 2329 Tukdab, Darjeeling 6 000 feet  
34  
46  
1lb

### 3 TODDALIA, Juss

Contains two species one the rambling stramentose shrub here described the other *T. villosa* W and A Hook f Ind 1 497 Beddome xlvii a handsome tree of the Western Ghats always unarmed and reaching 3 feet in girth

**1 T aculeata**, Pers, Hook f Ind 1 497, Beddome xlvii, Brandis 46, Kurz 1 183, Gamble 14 *Scopelia aculeata*, Sm, Roxb II Ind 1 616 Vern *Kany*, Hind, *Dahan, lahan*, Kayputana, *Meinkara* Nep, *Saphyris* Lepcha, *Mikararana*, Tam, *Kondakashinda*, Tel A large scandent shrub, the branches covered with prickles Wood poisonous, yellowish white, soft Pores moderate sized, very numerous, often subdivided, uniformly distributed Medullary rays very fine, uniform and equidistant

Outer Himalaya from Kumaun eastwards Khasia Hills and Western Ghats ascending to 7 000 feet The root bark gives a yellow dye and a bitter and aromatic tonic used by natives in some parts of the country as a remedy for fever (*Bridic*) E 2825 Tukdab Darjeeling 6 000 feet

### 4 SKIMMIA, Thunb

**1 S Laureola**, Hook f, Hook f Ind 1 499, Brandis 50, Gamble 14 Vern *Nei, barru*, Pb, *Nehar, gupata*, Kumaun, *Chum-lan*, Nep, *Timburnyok*, Lepcha An extremely aromatic shrub Bark thin bluish grey Wood white, soft, with distinct, white, concentric lines which may possibly be annual rings, has an aromatic scent when fresh cut Pores extremely small, in narrow, irregularly bent lines Medullary rays fine, numerous Himalaya from the I dus to Bhutan from 5 000 to 11 000 feet Afghanistan We ght 42 lbs per cubic foot The leaves are eaten in the Himalaya in curries

H 2846 Mahasu, Simla 8 000 feet  
E 2330 Tukdab Darjeeling 6 000 feet  
43  
1lb

### 6 MURRAYA, Linn

Besides the species described *M Konigii* Spr Hook f Ind 1 503 Beddome xlvii Brandis 48 Kurz 1 190 Gamble 14 (*Bergera Konigii* Linn, Roxb f Ind 1 376) Vern *Gandla gani lo cala* Pb *Marr kati* Hind *Barangna* Dn, *Chiangi* Hyderabad *Karepak karappa* Tel *K. incisa* Tan is a small tree of the forest of Malaya from the Kavi to Assam Bengal South India and Burma whose leaves are used for flavouring curries The wood is close even grained, hard and durable and is used for agricultural implements

**1 M exotica**, Linn, Hook f Ind 1 502, Roxb f Ind 1 374, Beddome xlvii, Brandis 18, Kurz 1 190, Gamble 11 Vern *Marchula, juti*, Hind, *Kamini*, Beng, *Naga golunga*, Tel, *Kakel-berar*, Gondi, *Suiali*, Nep, *Shitum*, Lepcha, *Makay*, Burm, *Machalla*, And A shrub or small tree, with thin grey bark Wood light yellow, close grained, very hard, apt to crack Pores very small, sometimes

1. *EVODIA*, Forst.

Contains 6 species of Indian small trees or shrubs. *E. villosa*, Wall.; Hook. Fl. Ind. i. 489; Kurz; i. 179, is a small tree of Tenasserim; *E. rutecarpa*, Hook. f. and Th., a small tree of the inner valleys of Sikkim, between 7,000 and 10,000 feet; and *E. meliosjolia*, Bth., a small tree of Assam.

1. *E. fraxinifolia*, Hook. f.; Hook. Fl. Ind. i. 490; Gamble 13. Vern. *Kanukpa*, Nep.; *Kant*, Lepcha.

A small tree. Bark smooth, light grey,  $\frac{1}{16}$  inch thick. Wood white, soft. Pores small, often subdivided, numerous near the inner edge of each annual ring. Medullary rays short, moderately broad.

Eastern Himalaya in Sikkim, between 4,000 and 7,000 feet, Khasia Hills from 3,000 to 5,000 feet.

E 3101. Darjeeling, 7,000 feet

21  
lbs.

2. *E. Roxburghiana*, Benth.; Hook. Fl. Ind. i. 487; Kurz i. 180. *E. triphylla*, Beddome xli. *Rugosa triphylla*, Roxb. Fl. Ind. i. 416. *Kantborghium triphyllum*, Thwaites Enum. 69. Vern. *Wedede*, *lunnunkenda*, Cingh.

A small tree. Wood greyish brown, moderately hard. Pores small, uniformly distributed. Medullary rays short, distant, fine to moderately broad.

Khasia Hills, South India and Ceylon, Tenasserim and the Andaman Islands.

Weight, 51 lbs., according to A. Menzies.

- No. 60. Ceylon Collection . . . . . 51  
lbs.

B 1979 collected by Kurz in the Andamans in 1866 and marked *E. triphylla*, DC. (Hook. Fl. Ind. i. 488; Kurz i. 180), has a soft pale red wood, with moderate-sized, oval, elongated and subdivided pores, and very fine and closely packed medullary rays.

2. *XANTHOXYLUM*, Linn.

A genus containing 10 small, rarely large trees or straggling or climbing shrubs, most of them of very little importance. Besides the one described: *X. acanthopodium*, DC.; Hook. Fl. Ind. i. 493; Kurz i. 181; Gamble 14. Vern. *Bogay tinu*, Nep., is a small tree of the outer Himalaya from Kumaun to Sikkim and the Khasia Hills, ascending to 7,000 feet; *X. Rhetsa*, DC.; Hook. Fl. Ind. i. 495, Beddome xli. (*Rugosa Rhetsa*; Roxb. Fl. Ind. i. 417) Vern. *Rhetsa mdu*, Tel.; *Sessal*, Mar.; *Rattu kin*, Bingb. is a large tree of the Western and Eastern Ghats of South India; and *X. Rudwanga*, DC.; Hook. Fl. Ind. i. 495; Kurz i. 182. Vern. *Boryonadi*, Ass.; *Mayaning*, Burma, is a tree of Eastern Bengal, Chittagong and Burma, with a rather heavy, soft, yellowish white, close-grained wood. The rest are shrubs or climbers.

1 *X. alatum*, Roxb. Fl. Ind. iii. 768; Hook. Fl. Ind. i. 493;

Beddome xli.; Brandis 47; Gamble 14. Vern. *Timbur*, *tinu*, *tezmal*, *dkrmt*, Hind.; *Balay tinu*, Nep.; *Sungri*, Lepcha.

A shrub or small tree. Bark corky, young stems with thick conical prickles with a corky base. Wood close-grained, yellow. Pores small, often in radial lines, not uniformly distributed; belts with numerous pores often alternating with belts with scanty pores. Medullary rays fine, short, very numerous.

Outer Himalaya from the Indus to Bhutan, ascending to 7,000 feet, Khasia Hills.

or making tooth brushes. Fruit and to purify water. The whole

H 107 Bhaji Simla 4000 feet  
E 2329 Tukdab, Darjeeling 5000 feet  
34  
46  
lbs

### 3 TODDALIA, Juss

Contains two species one the rambling sarmetose shrub here described the other *T. villosa* W and A Hook f Ind 1 497 Beddome xlin a handsome tree of the Western Ghats always unarmed and reaching 3 feet in girth

1 *T. aculeata*, Pers, Hook f Ind 1 497, Beddome xlin, Brandis 46, Kurz 1 183, Gamble 14 *Scopelia aculeata*, Sm, Roxb 11 Ind 1 616 Vern Kany, Hind, *Dahan, lahau, Rajputana, Alankara* Nep, *Saphygnik, Lepcha, Mikirana, Tam, Kondakashinda, Tel*

A large scandent shrub, the branches covered with prickles. Wood porous, yellowish white, soft. Pores moderate sized, very numerous, often subdivided, uniformly distributed. Medullary rays very fine, uniform and equidistant

Outer Himalaya from Kumaun eastwards Khasia Hills and Western Ghats ascend ing to 7000 feet.  
The root bark gives a yellow dye and a bitter and aromatic tonic, used by natives in some parts of the country as a remedy for fever. (*Bidie*)  
E 2855 Tukdab Darjeeling 5000 feet

### 4 SKIMMIA, Thunb

1 *S. Laureola*, Hook f, Hook M Ind 1 499, Brandis 50, Gamble 14 Vern *Nei, baru, Pb, Nehar, gutipata, Kumaun, Chinnant, Nep, Tumburghol, Lepcha*  
An extremely aromatic shrub. Bark thin bluish grey. Wood white, soft, with distinct, white, concentric lines which may possibly be annual rings, has an aromatic scent when fresh cut. Pores extremely small, in narrow, irregularly bent lines. Medullary rays fine, numerous

Himalaya from the Indus to Bhutan from 5000 to 11000 feet Afghanistan Weight 42 lbs per cubic foot. The leaves are eaten in the Himalaya in curries  
H 2846 Mahasu, Simla 8000 feet  
E 2330 Tukdab, Darjeeling 5000 feet  
42  
lbs

### 6 MURRAYA, Linn

Spr Hook f Ind 1 503 Beddome 4 (*Bergera Konigii* Linn Roxb f *Pb Haru latum* Hind *Baranaga, ariceps* Tel *Kamcepila* Tam is a small tree of the outer Himalaya from the Kavi to Lhasa Bengal South India and Burma whose leaves are used for harrowing curries. The wood is close, even grained, hard and durable and is used for agricultural implements

1. *M. exotica*, Linn, Hook f Ind 1 502, Roxb M Ind 1 371, Beddome xlin, Brandis 48, Kurz 1 190, Gamble 14 Vern *Alarchula, juti, Hind, Kamin, Beng, Naga golunga, Tel, Rakel berar, Gondi, Swali, Nep, Shittem, Lepcha, Makay, Burm, Wachalla, And* A shrub or small tree, with thin grey bark. Wood light yellow, close grained, very hard, apt to crack. Pores very small, sometimes

in short radial lines. Medullary rays fine, very numerous. Sharp, white, concentric lines, which frequently run into each other.

Outer Himalaya from the Juma to Assam ascending to 4,500 feet, Behar, South India, Burma and the Andaman Islands.

Weight, 62 lbs. per cubic foot is the average of our specimens; Wallich gives 61 lbs. The wood resembles boxwood and has been tried for wood-engraving, for which it seems suitable if well seasoned; it is also used for handles of implements. It is often planted for ornament, and is sometimes called "Satinwood" at Port Blair.

B 3195.	Andaman Islands (Home, 1874, No. 24).	63
B 519.	Andaman Islands	62
No. 26.	Ceylon Collection	61

## 5. ATALANTIA, Correa.

Contains 5 small trees of South India and Burma. *A. vacinosa*, W. and A.; Hook. Fl. Ind. i. 512; Beddome xvi, is a small tree of South India and Ceylon; *A. caudata*, Hook. f.; Hook. Fl. Ind. i. 513, a shrub of the Khasia Hills; and *A. macrophylla*, Kurz i. 195, an evergreen tree of the coast forests of the Andamans.

1. *A. monophylla*, Correa; Hook. Fl. Ind. i. 511; Beddome xvi; Kurz i. 195. Vern. *Arawi nim*, Tel.; *Katyali*, Tam.; *Maknur*, Mar.

Wood yellow, very hard and close-grained. Pores very small; in groups or short radial lines. Medullary rays very fine, numerous; the distance between the rays greater than the transverse diameter of the pores. Numerous white concentric lines at varying distances.

Eastern Bengal, Southern India and Ceylon. Weight, 65 lbs. per cubic foot. Recommended by Kurz as a substitute for boxwood.

No. 10.	Salem Collection	65
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2. *A. missionis*, Oliv.; Hook. Fl. Ind. i. 513; Beddome xvi. *Limo-nia missionis*, Wall.; Thwaites Enum. 45. Vern. *Pambur*, Cingh.

Wood yellowish white, moderately hard, close-grained. Annual rings marked by a white line, and a belt of more numerous pores. Pores small, uniformly distributed. Medullary rays fine, wavy, very numerous, uniform, not equidistant.

South India and Ceylon. Weight, 48 lbs. per cubic foot. The wood is used for furniture and cabinet work, it is sometimes variegated.

No. 66.	Ceylon Collection	48
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## 7. FERONIA, Correa.

1. *F. Elephantum*, Correa; Hook. Fl. Ind. i. 516; Roxb. Fl. Ind. ii. 411; Beddome t. 121; Brandis 56; Kurz i. 198; Gamble 15. The Wood Apple. Vern. *Bilin*, *kait*, *kat-del*, Hind.; *Kath-bel*, Beng.; *Vallanga*, *veld*, *kaait*, Tam.; *Velaga*, *elaka*, *yellanga*, Tel.; *Bilwar*, Kan.; *Kawat*, Mar.; *Hman*, Burm.

A large tree. Bark dark grey or nearly black. Wood yellowish white, hard. Annual rings distinctly marked by a white line. Pores small, in short radial lines, joined by short, narrow, white, concentric bands. Medullary rays short, white, prominent, fine and moderately broad, very numerous, not straight. Structure similar to that of *Myte Alarnelos* and *Crateva religiosa*.



Sub-Himalayan forests from the Ravi eastwards, Bengal, South India, Chanda district in the Central Provinces  
Weight 50 lbs per cubic foot, according to Skinner, No 74. It is used for house building, masts of wheels (Cunningham), 616 (Skinner). The wood is used for a gum similar to gum arabic. The pulp of the fruit is acid and is made into jelly.

E 2487 Calcutta

# 8 AEGLE, Correa

1. *A. Marmelos*, Correa, Hook. f. Ind. 516, Roxb. f. Ind. 579, Beddome t. 161, Brandis 57, Kurz 198, Gamble 15. The Bel Tree Vern. *Bel*, Hind. *Bela*, Beng. *Mahaka* Gondi, *Bela*, Kuiru, *Vilva*, Tam. *Maredu*, *palir*, *marat*, Tel. *Bitlapati*, Kan. *Okshil*, Burm. A small tree, bark  $\frac{1}{2}$  inch thick, outer substance soft, grey, exfoliating in irregular flakes. Wood yellowish white, hard, with a strong aromatic scent when fresh cut, no heartwood, not durable, readily eaten by insects. Pores small, uniformly distributed. Medullary rays wavy, fine, short, white, numerous, uniform and equidistant. Annual rings marked by distinct lines, and often by a continuous belt of pores. In some cases the pores are more numerous in the autumn wood.

Sub-Himalayan forests from the Jhelam eastwards, Central and South India, Burma. Weight, 40 to 50 lbs (Brandis), Wallich gives 49, our specimens average 57 lbs. The tree is not often cut, as it is chiefly valued for its fruit the pulp of which is used medicinally in diarrhoea and dysentery, as a sherbet and as a conserve. Keeping well when dry. The wood is used in construction for the pestles of oil and sugar-mills, masts and other parts of carts, and for agricultural implements.

P	441	Ajmere
O	248	Garhwal (1868)
O	268	"
C	1176	Abm Reserve, Central Provinces
C	2785	Melghat Betar
E	2486	Calcutta
E	638	Goipara, Assam
B	561	Prome Burma

The structure of *Crataeva religiosa* is very similar to this, but the wood is much softer, and the pores are enclosed in patches of soft tissue.

## ORDER XXIV SIMARUBEÆ

Contains eight genera of Indian trees or shrubs almost always with bitter bark. They belong to 2 Tribes, viz., —

- Tribes I — Simarubæ.
- " II — Pterantheæ.

*Harrisonia Bennettii*, Hook. f. Ind. 519, Kurz 1 203 Vern. *Tapooban* Burm. is a small spinous tree of Burma. *Brucella* contains two bitter shrubs *B. sumatrana*, Roxb. f. Ind. 4 and *B. sumatrana*, and *Teinasserim* and the Andam Islands, and Gamble 15, of Sikhim, Bhutan, Sylhet and Bur

is a small tree of *Teinasserim*

Wood white, soft (moderately hard in *Balanites*); no heartwood. Pores moderate-sized. Medullary rays moderately broad to very broad.

# 1. ATLANTHUS, Desf.

Besides the two species described, *A. glandulosa*, Desf., is a lofty tree, indigenous in Japan, but occasionally planted both in Europe and in Northern India. It grows rapidly, throwing up abundant root suckers, and has for that reason been employed in plantations made to clothe barren stony hills in the south of France. It is also often employed as an avenue tree, and is cultivated in gardens.

1. *A. malabarica*, DC.; Hook. Fl. Ind. i. 518; Beddome t. 122; Brandis 58; Kurz i. 200. Vern. *Penn*, Tam., Tel.; *Dhup*, *bagga-dhup*, *gogul-dhup*, Kan.; *Alatti pal*, Annamalais; *Kambalu*, *walbling*, Cingh. A large deciduous tree, with thick, rough bark. Wood white, very soft and spongy. Pores large, scanty, subdivided. Medullary rays short, moderately broad, the distance between the rays being larger than the transverse diameter of the pores.

Western Ghats, rare in Pegu. Often planted in South India for ornament. Weight, 23 lbs. per cubic foot. Wood not used. The tree gives a gum resin which is used medicinally, especially in dysentery. For Mr. Broughton's report on an analysis of it see Beddome t. 122.

W 746. South Kanara

lbs.  
23

2. *A. excelsa*, DC.; Hook. Fl. Ind. i. 518; Roxb. Fl. Ind. ii. 450; Brandis 58. Vern. *Arwa*, Meywar; *Maharukh*, Hind., Mar.; *Penn*, *pee*, Tam.; *Pedu*, *pey*, *pedda*, Tel.; *Gorini-kawat*, Urya. A large tree. Wood soft, white. Structure similar to that of *A. malabarica*.

Central and Southern India. Often planted. Weight, 28 lbs. per cubic foot. Wood used to make floats for fishing, sword handles, spear sheaths and catamarans. The bark is aromatic and is used as a febrifuge and tonic.

C 2784. Melghat, Berar  
No. 4. Salem Collection

lbs.  
28

## 2. SAMADERA, Gaertn.

2. *S. indica*, Gaertn.; Hook. Fl. Ind. i. 519; Thwaites Enum. 70; Beddome xlix; Kurz i. 200. Vern. *Samadara*, Cingh.; *Kathai*, Burm. A small tree. Wood light yellow, soft, no heartwood. Pores small; scanty. Medullary rays very fine, uniform, closely packed.

South India and Ceylon. Weight, 26 lbs. per cubic foot. The bark is used as a febrifuge.

No. 76. Ceylon Collection  
lbs.  
26

## 3. PICRAMMA, Bl.

B 1977. collected by Kurz in the Andamans in 1866 and marked *P. javanica*, Bl. Vern. *Thityobon*, Burm., has a soft, white wood. Pores small, uniformly distributed, joined by fine, concentric lines. Medullary rays short and fine. Weight, 27 lbs. per cubic foot.

Besides this species, *P. nepalensis*, Benn. is a small tree of Nepal and the Khasia Hills, and *P. quassoides*, Benn.; Hook. Fl. Ind. i. 520; Brandis 59, Vern. *Tutkai*,

*titau, kala, Pb*, *Chavangi*, Hind, is a tall shrub of the outer Himalaya from the Chunar to Nepal, occasionally ascending to 8,000 feet, with a bitter bark, which is used as a substitute for quassia

4 BALANITES, Delile.

1. B. Roxburghii, Planch, Hook Fl Ind 1, 522, Brandis 59, Kurz 1 204 B. *egyptica*, Delile, Brandis 60, Kurz 1 253 Vinn *Hingua, ingua, kingola, Hind*, *Garrab, Gondi, Gari, ringri, Tel.*, *Nangunda, Tam*, *Hingam, Mai*  
A small tree, with grey bark,  $\frac{1}{2}$  inch thick. Wood yellowish white, moderately hard, no heartwood, no annual rings. Pores small or moderate-sized, distributed in irregular bands and groups. Medullary rays short, very broad, on a radial section visible as narrow plates, with a few fine ones intervening  
Drier parts of India and Burma  
Weight, 48 lbs per cubic foot. Wood used for walking sticks and for fuel. From the seed a fixed oil is expressed. The seeds bark and leaves are used in native medicine, and the kernel of the fruit, filled with gunpowder, in fireworks

P 450 Ajmere C 1171 Aburi Reserve, Central Provinces  
48 lbs

ORDER XXV OCHNACEAE.

Contains two genera  
*Ochna* is described below  
Hook Fl Ind 1 525, Be  
Trana, Jack, of the sea coast of Tenasserim

Wood red or brown, grain close, but twisted. Pores small or very small, uniformly distributed. Medullary rays moderately broad

1. OCHNA, Linn

Besides the three species of crested, *O pumila*, Lam, is a small undershrub of the Sub-Himalayan tract, principally in sal forests, with a perennial underground stem throwing up annually, after the jungle fires, stems 2 to 3 feet high, bearing handsome yellow flowers

1. *O. squarrosa*, Linn, Hook. Fl Ind 1, 523, Roxb. Fl Ind 1 613, Brandis 60. Vern. *Sunari, yetta-juri, Tel*, *Narole, munda, Kan*, *Komari, Uriya*  
A shrub or small tree. Wood reddish brown, moderately hard, close-grained. Pores very small, very numerous, between the moderately broad, but not very prominent medullary rays, which are clearly visible on a radial section

Bengal, Burma and South India.  
Weight, 51 lbs per cubic foot

C 1303 Gumbur

the

2. B. 1978 collected by Kurz in 1866 in the Andaman Islands and marked *O andamanica*, Kurz, has a red, hard wood, with the medullary rays prominent on a radial section, similar in structure to that of *O squarrosa*. Weight, 53 lbs per cubic foot

3. O. Walliichii, Planch; Hook. Fl. Ind. 524; Kurz i. 205. Vern. *Kodiyak*, Burm.  
A deciduous tree. Wood light brown, hard, close-grained. Pores small, uniformly distributed. Medullary rays fine and moderately broad, prominent on a radial section.

Burma.  
Weight, 54 lbs. per cubic foot.  
B 3132. Burma (1862)

54  
lbs.

## ORDER XXVI. BURSIFERACEÆ.

Contains seven genera of Indian trees, often resinous. They all belong to the Tribe *Burseræ*, viz.: *Protium*, *Boswellia*, *Garuga*, *Balsamodendron*, *Bursera*, *Canarium* and *Ellicium*. *Protium* contains two South Indian trees: *P. candatum*, W. and A.; *Ellicium*, Fl. Ind. i. 530; Beddome t. 125. Vern. *Konda muntti*, Tel.; *Kilevay*, Nilave, Tam.; *Konda mdu*, Kan., a deciduous tree with green bark, often used for planting in avenues; and *P. pubescens*, W. and A., a small tree, resembling the former species.

Wood marked by fine distant medullary rays, and small or moderate-sized, uniformly distributed pores.

## 1. BOSWELLIA, Roxb.

1. B. thurifera, Colebr.; Roxb. Fl. Ind. ii. 383; Beddome iii.; Brandis 61. *B. serrata*, Roxb.; Hook. Fl. Ind. i. 528. *B. glabra*, Roxb.; Beddome t. 124. Vern. *Salle*, *salei*, *salga*, Hind.; *Gaggur*, *dumsal*, Kumaon; *Salla*, *bor-salai*, *ganga*, Gondi; *Luban*, *salai*, Beng.; *Kungli*, *gugli*, *kundrikam*, *morada*, Tam.; *Andukku*, *anduga*, *parangi*, Tel.; *Chittu*, Kan.

A moderate-sized, often gregarious tree. Bark  $\frac{3}{4}$  inch thick, yellow, sometimes greenish yellow, exfoliating in small, hard, irregular flakes and thin plates of much larger size. Wood rough, white when fresh-cut, darkening on exposure, moderately hard. Pores moderate-sized, often subdivided. Medullary rays fine and moderate; on a radial section distinctly visible as long narrow plates.

Intermediate, northern and southern dry zones, Sub-Himalayan tract from the Sutlej to Nepal, drier forests of Central and Southern India.

Weight, 30 to 35 lbs. per cubic foot (Brandis); our specimens give 32 lbs. Wood not durable, but it has been reported that 5 sleepers made of it and soaked for some time in a tank filled with the leaves of *Bahera* (*Ternstroemia bellirica*) and water and put down in June 1876 on the Holkar and Neemuch State Railway are still perfectly sound and good. (Indore Forest Report, 1876-77, quoted in *Indian Agriculturist* of May 1878.) It is used for fuel and for making charcoal, which in Nimar is used for iron smelting. From wounds and cracks in the bark it gives a transparent, fragrant, green resin, having an agreeable scent when burnt. It is used medicinally as a diaphoretic and astringent, to make ointment for sores, and as incense (*Labdanum*, *kundli*, *kundira*, *kundrikam*), but is not the true frankincense, which is the produce of a tree of the Somali country and Arabia. (Birdwood in Linn. Trans. xxvii, p. 146. Cooke's Report on the Gums, Resins, Oleo-resins and Resinous Products in the India Museum, p. 81, 1874.)

P. 3215. Nagpohar, Ajmere

C 1112. Almir Reserve, Central Provinces

C 2780. Melghat Forest, Perrar

lbs.  
36  
28

## 2. GARUGA, Roxb.

1. G. pinnata, Roxb. Fl. Ind. ii. 400; Hook. Fl. Ind. i. 528;

Beddome t. 118; Brandis 62, Kurz i. 207, Gamble 15. Vern. *Kharpal, katia, khimura, sarola*, Ph., *Ghogar, karkai*, Hind.; *Gurya*, Banda, *Kukar, karkra, ghunya, maharui*, C P., *Jum, Lharpat, nil bharat*, Beng., *Mohi, Urya, Gia, Mechi, Dababbar*, Nep., *Malat, Lepcha; Gendeli poma*, Ass., *Chilompa, Garo, Mionung-shizha, Magh, Gaiyaga, gaidga, Tel; Gupni, kekia, Gondi, Kelkeda, Kuibu, Karre vembu, Tam, Kuruk, Mar; Chinyok, Burm.*  
A large deciduous tree. Bark 1 inch thick, soft, red inside, grey or brown outside, exfoliating in large irregularly shaped scales; sapwood large, heartwood reddish, moderately hard. Pores large, not numerous. Medullary rays short, moderately broad, on a radial section visible as narrow horizontal plates.

cubic foot The specimens here of 40 lbs This is, very likely, but it seasons well It is used as used for tanning and the leaves . The fruit is sometimes eaten

O	225	Gurhal (1868)	39	lbs
O	316	Gosakhpur (1868)	39	
C	1107	Chanda, Central Provinces	39	
E	648	Darjeeling, Terai	39	
E	1389	Chittagong	46	
B	812	Burma	39	

3. BALSAMODENDRON, Kunth.

Contains four species of balsamiferous, often spiny shrubs or trees Besides *B pubescens*, Stocky, Hook Fl Ind. such, a small tree of Beluchistan and the far south as Karachi It yields a small gum, almost entirely soluble in water. Brandis 65, Beddome t 126, is a tree of nt It is very la, Beng, is a small tree of Eastern African coast of the Red Sea.

1. B. Mukul, Hook. Fl. Ind. i. 529; Brandis 61 Vern. *Gigat, Sindhi*. A small tree, bark greenish yellow, peeling off in long thin, shining paper-like scrolls. Wood soft, white. Pores small. Medullary rays fine, short.

Arid zone, Sind, Kattywar, Rajputana, Khandesh

olds a gum called in the bark, and is

P	418	Ajmere	...	lbs.
P	2919	Rajputana	...	
P	3238	Dewar, Ajmere	...	20

1. BURSIA, Linn.

1. B. serrata, Colbr.; Hook Fl. Ind. i. 530, Brandis 61, Kurz i. 208. Vern. *Murtenga, Asz; Thadeben, Burm.*  
A large evergreen tree. Wood hard, sapwood light brown, heartwood red, close-grained. Pores small, uniformly distributed. Medul-

lary rays fine, red; on a radial section distinctly visible as narrow dark

bands.

Eastern moist zone, Bengal, Assam, Chittagong and Burma.  
Weight, 46 lbs. per cubic foot. Wood good for furniture.

B 313. Burma (1867)

B 2225. Andamans (similar in structure, but wood lighter and softer)

46  
lbs.

## 5. CANARIUM, Linn.

Contains 4 large resinous trees of Southern India, Eastern Bengal and Burma. *C. strictum*, Roxb.; Hook. Fl. Ind. i. 534; Beddome t. 128, is the Black Dammer Tree, Vern. *Karapu konghiam*, Tam.; *Manda dhip*, Kan.; *Thelli*, Mal., a tall tree of Southern India, giving a brilliant black gum used medicinally and for other purposes (for Mr. Broughton's analysis of it, see Beddome under t. 128). *C. euphyllum*, Kurz, i. 208 and *C. coccineo-bracteatum*, Kurz, i. 209 are large trees of the Andaman Islands.

1. *C. bengalense*, Roxb. Fl. Ind. iii. 136; Hook. Fl. Ind. i. 534; Kurz i. 209; Gamble 15. Vern. *Goguldhip*, Nep.; *Narockpa*, Lepcha; *Tekreng*, Garo; *Bigyang*, *dhina*, Ass.

A tall tree with straight cylindrical stem. Bark light coloured, hard, thin, rough with horizontal wrinkles. Wood shining, white when fresh cut, turning grey on exposure, soft, even-grained, does not warp, but decays readily. Pores scanty, large, often oval and subdivided, prominent on a vertical section. Medullary rays fine, white; on a radial section distinctly visible, giving the wood a mottled appearance.

Eastern moist zone, Himalaya, Bengal and Burma.  
Weight, 28 lbs. per cubic foot. The wood is much esteemed in Bengal for tea-boxes, and it is also used for shingles. The tree yields a resin which is used as incense; it is clear, amber-coloured and brittle.

B 703. Great Rangit Valley, Darjeeling, 3,500 feet

113  
lbs.

## 6. FILICUM, Thwaites.

1. *F. decipiens*, Thwaites Enum. 59; Beddome t. 129; Hook. Fl. Ind. i. 539. Vern. *Katu pueras*, Tam.; *Pehimbua*, Cingh.  
A tree with elegant fern-like leaves. Heartwood red, moderately hard. Pores small, in groups or short radial lines. Medullary rays fine, numerous, at unequal distances.

Western Ghats up to 4,500 feet, Ceylon.  
Weight, 68 lbs. per cubic foot (A. Mendis). Wood strong, valuable for building.

No. 70. Ceylon Collection . . . . . 68

## ORDER XXVII. MELIACEÆ.

An Order containing about 20 trees or shrubs, chiefly of the moist zones.  
The Order is divided into 4 Tribes, viz.:—

- Tribe I.—Meliæe . . . . .  
*Twreæ*, *Naregamia*, *Munronia*,  
*Melia* and *Cipadessa*.  
 II.—Trichilæe . . . . .  
*Dysoxylum*, *Chisocheton*, *Sando-*  
*vicum*, *Alata*, *Tansium*,  
*Amora*, *Walsura*, *Heynea*,  
*Beddomea*, and *Carapa*.  
 III.—Swietenieæ . . . . .  
*Soyimila*, *Chichervassia*, and  
*Swietenia*.  
 IV.—Cedreleæ . . . . .  
*Chloroxylon* and *Cedrela*.

Of these 20 species 10 are described here. The remaining 10 are of much less importance. *Surrea viridis* Dunn and *Nargamnia alata*, W and A are shrubs of Southern India. *Munronia Walllichii* Wright is a shrub of the Eastern Himalaya and the Nilgiris, *Cupadessa frutescens* Bl, Hook f, Ind 1 515 (*Mallota Rohit* Adr Juss. Beddome liv *Ekebergia indica* Roxb f, Ind 1 392) Vern *Nal bida* Hind *Chendabera puridona* Tel is a small tree of the western coast, used for fuel. *Choscheton* contains 3 evergreen trees *C grandiflorus* Kurz 1 216 Vern heavy, hard and close grained wood Burma, while *C paniculatus* Hiern *paniculata* Roxb f, Ind 1 212) V Hills and Eastern Bengal *Aglaia* contains about 10 species chiefly Burmese or East Himalayan trees among which *A Roxburghiana* W and A Hook f, Ind 1 555 Beddome t 130, a large tree of the Western Ghats with a strong useful timber, and *A edulis* A Gray Hook f, Ind 1 556, Gamble 16 (*Mitrasa edulis*, Roxb f, Ind 1 637) Vern *Latis mahica* Nep *Sinakadang* Ipecha, Gunia noticed the W 565, I try ga tree of Khasia —

Wood red (yellow in *Chloroxylon*, dark reddish brown in *Sagmida*) Heartwood generally hard and dark coloured, not distinct in *Cedrela* in several species of *Melia* and *Dysoxylon*. Pores varying in size, often subdivided, rays prominent on a vertical section. Medullary rays fine, numerous and sharply marked in *Chloroxylon*, *Sandoricium* and *Melia*, broader and often less prominent in the other genera. Con- centric bands of softer texture in *Amooia Rohituka* and *Mitrasa robusta*

# / 1 MELIA, Linn

Besides the three species the wood of which is here described *M. excelsa* Jack, Hook f, Ind 1 511 Kurz 1 212, and *M. binmaica*, Kurz 1 213 Vern *Thauma kha*, Dunn, are evergreen trees of Burma. The wood of *M. dubia* and *M. azadirachta* resembles that of *Cedrela* in structure, but differs in having fine and numerous medullary rays *M. indica* has a distinct heartwood, which is hard and close grained, but the pores and medullary rays are similar to those of the two species first named

1 *M. indica*, Brandis For f, 67 *M. adirachta*, Linn, Hook f, Ind 1 511, Kurz f, Ind 1 394, Beddome t. 13 (1 by mistake), Kurz 1 212 The Neem or Margosa Tree Vern *Adad-darakh*, *neb*, *Pers*, *Nim*, Hind *Belau*, *Kumau*, *Agas*, *Palamow*, *Limbo*, *C P*, *Kohumba*, *Guz*, *Nimur*, *Sindi*, *Vegpam*, *Lam*, *Iapa*, *ya*, *Yamabau-tempa*, *Tel*, *Limbo*, *Nimday*, *Mar*, *Berina*, *Ueu*, *heb*, *beru*, *Kan*, *Thimban- ta ma-kha*, *Burm*. A large tree. Bark grey, with numerous scattered tubercles. Sapwood grey, heartwood red, very hard. Annual rings doubtful the wood shows alternating bands with numerous and with fewer pores, also white concentric lines, whether these are annual rings is a matter for further enquiry. Pores moderate sized and large, often oval and sub- divided, visible on a vertical section. Medullary rays fine, numerous

white, prominent, bent outwards where they touch the pores; the distance between the rays less than the transverse diameter of the pores. Planted and self-sown throughout the greater part of India and Burma. The weight and transverse strength have been determined by the following experiments:—

Weight.	Value of P.
49 lbs. 539	Found
50 "	"
52 "	"
57 "	"
315 "	"
46 "	"
53 "	"

P.	163.
D	1033.
No.	11.
Salm Collection	.
Salem, Madras	.
Ajmere (sapwood)	.
Hook. Fl. Ind.	i. 544; Roxb. Fl. Ind.
. ii.	.
(also <i>M. sempervivens</i> , Sw.)	; Beddome t. 14 (13 by mistake); Brandis
G.S.; Kurz i.	212; Gamble 16. The Persian Liliac, Bastard Cedar or Bead
Tree.	Vern. <i>Cheer, kacheer, Sutej; Dreeh, bakarin, bakyian, betain, deishua,</i>
bakarya, Hind;	<i>Alaka timbo, malla nim, muhl;</i> C.P.; Bakavinu, Nep.;
<i>Allalay nembu,</i> Tam.;	<i>Tavarka ceppa, makavanim,</i> Tel.;
Kan.;	<i>Ta-mu-kha, Bium.</i>

A tree with smooth grey bark. Sapwood yellowish white; heartwood soft, red. Annual rings marked by a broad belt of large pores, the outer part of each annual ring containing a few smaller-sized pores which are joined by irregular, wavy, concentric bands of soft tissue. Medullary rays moderately broad; visible on a radial section as long rough plates. Pores very prominent on a longitudinal section.

Commonly cultivated throughout India, and believed to be indigenous in the outer Himalaya, Siwalik tract and the hills of Beluchistan. Growth rapid, 3 to 4 rings per inch of radius; it coppices freely. Weight, 30 lbs. according to Skinner, No. 92; our specimens give an average of 38 lbs. Skinner gives the value of P at 596. Wood used for furniture. Beddome, Brandis and Kurz all say it warps and splits, but Mr. Halsey of Madhopur writes to say that it is equally useful either green or seasoned. Our specimens split only very slightly, and we are inclined to think it is better than it has been supposed to be. The wood is very handsomely marked and polishes well. The bark is extremely bitter and is employed as an anthelmintic. The fruit yields an oil, and the nuts are frequently strung as beads. The leaves and pulp of the fruit are used in native medicine.

[illegible]



A large deciduous tree, with smooth, dark-brown bark. Sapwood grey, heartwood reddish white, soft. Pores large, generally round, visible on a vertical section. Medullary rays white, fine, scanty, prominent on a radial section. The structure resembles that of Teon, but all the pores are of the same size and the wood is softer. The annual rings are marked by more numerous, but not larger pores.

Eastern Himalaya South India, Ceylon and Burma. Growth rapid, 2 to 3 rings per inch of radius in the Madras specimen, that from Bengal was moderate, 7 rings per inch. Roxburgh says that a tree of *M. robusta* grown in the Calcutta Botanic Gardens from Malabar seed produced in 7 years trees 46 feet high with a girth of 44 inches at 4 feet from the ground, which is equivalent to about 1 ring per inch of radius. Also that another, of *M. superba*, from seed sent by Dr Berry from Banda reached in 6 years a height of 43 inches. Weight, 26 to 33 lbs per cubic foot. The wood will probably be found useful for tea-trees should be cultivated on account of its rapid growth.

E 706	Great Rangit Valley, Darjeeling	
D 1093	Madura, Madras	
No. 49	Ceylon Collection	
33		
20		
26		

*Melastoma speciosa* similar to that of in Islands

## 2. DYSOXYLUM, Blume

Besides the three species here described the following occur in India. *D. grande* Hiern, Hook. f. Ind. 1. 517, a tree of Sylhet, *D. pallens* Hiern, Hook. f. Ind. 1. 518, a tree of Sikkim and the Khasia Hills, *D. malabaricum*, Bedd., Hook. f. Ind. 1. 519, in Porap Kaders, and *D. Bedd.* in India. The leaves of several are compound, with oblique often containing large brightly coloured seeds.

Wood reddish, rough, moderately hard. Pores prominent on a vertical section, moderate sized to large, often subdivided.

1. *D. binectariferum*, Hook. f., Hook. f. Ind. 1. 516, Kurz 1. 215, Gamble 16. *D. macrocarpum*, Bl., Beddome liv, t. 150. *Gnarea binectarifera*, Roxb. 11 Ind. 1. 240. Vern. *Katongzu*, Lepcha, *Kangirata*, Cachar, *Borogolohara*, Assam.

A large evergreen tree. Wood reddish-grey, rough and close-grained, hard. Pores large and moderate-sized, often subdivided. Medullary rays moderately broad, red, wavy, irregularly distributed, the distance between the rays generally larger than the transverse diameter of the pores.

Sikkim ascending to 2,000 feet, Assam, Khasia Hills, Chittagong and the Western Ghats. Weight, our specimens give 45 lbs. per cubic foot. Wood worthy of notice.

E 611 Khyrbani Forest, Darjeeling Terai. . . . . 41 lbs.

2. *D. procerrum*, Hiern, Hook. f. Ind. 1. 517, Kurz 1. 214. Vern. *Dinjori*, *goronghola* (Vall), Assam.

An evergreen tree. Wood bright red, moderately hard. Pores large,



1. *A. Rohituka*, W. and A.; Hook. Fl. Ind. i. 559; Beddome t. 182; Brandis 69; Kurz i. 220; Gamble 16. *Andersonia Rohituka*, Roxb. Fl. Ind. ii. 213. Vern. *Rohituka*, Sans.; *Harin hara*, *harin kana*, Hind.; *Sohaga*, Oudh; *Tikta-ray*, *putray*, Beng.; *Bandripah*, *Ala*, *Ala amar*, *amora amar*, Ass.; *Okhonngza*, Mal.; *Whitnee*, Burm.

in grey bark. Wood reddish, close and small and moderate-sized. Medullary rays 1 equidistant, distinctly visible on a radial section. Pores joined by reddish, soft, wavy, concentric lines. The concentric bands in this species are remarkable, as they are absent from the two other species here described.

Oudh, Assam, Northern and Eastern Bengal, Western Ghats and Burma.

Ben.  
O 1362 Gonda, Oudh  
E 2331 Mangwa, Darjeeling, 6,000 feet.  
E 1261 Tezpur, Assam  
E 711 Chittagong  
lbs. 42 36 39 45

2. *A. cucullata*, Roxb.; Hook. Fl. Ind. i. 560; Beddome iv.; Kurz i. 221. *Andersonia cucullata*, Roxb. Fl. Ind. ii. 212. Vern. *Amur*, *lati*, *nalmi*, Beng.; *Whitnee*, Burm.

A moderate-sized evergreen tree, with thin grey bark. Wood red, hard, close-grained, but apt to split. Pores small and moderate-sized. Medullary rays very fine, uniform, very numerous.

Ben.  
used for posts and other purposes in Lower

3. *A. spectabilis*, Miq.; Hook. Fl. Ind. i. 561; Kurz i. 221. Vern. *Amari*, Ass.

An evergreen tree. Wood red, hard, close-grained. Pores moderate-sized and large, often oval and subdivided, distinctly visible on a longitudinal section. Medullary rays fine, uniform, equidistant, prominent on a radial section, the distance between them less than the transverse diameter of the pores.

and P=792.  
takes a good polish. Used for boat-building  
Kyd's *Guarea (Amari)*. Weight, 47 lbs.

6. *WALSURA*, Roxb.

B 1986 is a specimen collected by Kurz in the Andaman Islands in 1866, marked *Walsura robusta*, Roxb.; Hook. Fl. Ind. i. 565; Kurz. i. 223. Vern. *Upphing*, Sylhet; *Gyopho*, *tsoukmayba*, Burm. Wood light red, very hard. Pores small, joined by numerous concentric lines. Medullary rays very fine, per cubic foot.



taken from an article in the

at 3 feet from ground —

No 1	30 inches
" 2	77 "
" 3	72 "
" 4	101 "
" 5	101 "
Average girth, 88 inches	

Trees planted in 1839 measured in May 1873, at 3 feet from ground —

No 1	57 inches	Height, 55 feet
" 2	40 "	" " 50 "
Trees planted in 1842 43 measured in May 1873, at 3 feet from ground —		
No 1	40 inches.	Height, 50 to 70 feet.
" 2	33 "	
" 3	24 "	

The first five vary from 3 to 4 rings per inch of radius, averaging 3 1/4 rings

" third three " 5 to 8  
 " second pair " 4 to 6  
 " first five " 3 to 4 rings per inch of radius, averaging 3 1/4 rings

From which it would seem that the 1827 28 and 1839 trees were from plan taken at 17 and 36 years respectively, consequently 30 years old. Taking the have a mean growth of 4 9/16 rings per age of 58 years corresponding to a girth faster than this, as the Calcutta average is 6 feet.

Cuba Mahogany, 6 experiments, bars 7' x 2" x 2" (6 feet between supports)	48 lbs	643
Honduras Mahogany, 6 experiments, bars 7' x 2" x 2" (6 feet between supports)	41 "	601
Mexican Mahogany, 6 experiments, bars 7' x 2" x 2" (6 feet between supports)	42 "	587

ments give value of P for the value of P for Honduras wood 637, as gives for Jamaica wood 516. Lastlett's experiments

The ultimate results. In the Saharanpur gardens the trees, as stated above, have never seeded as far as it is now known one or two trees in private gardens near Barrackpore, and two or three trees belonging to Government on the Barrackpore road have been seeded occasionally for many years past. One tree in the Barrackpore Park, and an old damaged and girdled tree in the Calcutta Botanic Gardens, which however, was blown down in the cyclone of 1864, have also seeded, but not freely. Whenever these trees did seed,

All attempt ever, been pre from layers are believed to be much more early than seedlings, but from their tendency to form low branching bushes, it is feared that they will not yield much valuable timber. It has therefore, been found necessary to depend upon the West Indies for supplies of seed as yet, and for some years past supplies have been received and the seedlings regularly distributed, chiefly in Bengal.



10 CHLOROXYLON, DC

1 C Swietenia, DC, Hook II Ind 1, 569, Beddome 11, Brandis 74 Swietenia Chloroxylon, Roxb FI Ind n 400 Salin Wood Vern Behia, girya, behru white, C P, Mududat, Tam, Billu, bilgu, Tel, Burus, purush, Tam, Behru, Uruya, Halida, bheria, Mar, Huragali, Mysore, Kurute, rial burute, Cingh

A moderate sized deciduous tree Bark  $\frac{1}{2}$  inch thick, soft, spongy, light grey or yellow Wood very hard, yellowish brown, the inner wood of a darker colour, but no distinct heartwood, with a beautiful satiny lustre, seasons well Annual rings distinct Pores very small Alternately rays fine, uniform and equidistant, very numerous, distinctly visible on a radial section as shining irregularly shaped plates, the distance between the rays is greater than the transverse diameter of

Year	Weight	Remarks
1829	3 experiments	Baker in 1829 with Madras wood 3 experiments with bars 6 x 2 x 2
1829	8	A Mendis No 8 with Ceylon wood with bars 3 x 1 x 1
1829	62	A Mendis No 62 with Ceylon wood with bars 2 x 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>2</sub>
1829	47	Skinner No 47 with Madras wood
1829	317	Puckle (Balfour p 317) with West Malabar wood 3 experiments with bars 2 x 1 x 1 <sup>1</sup> / <sub>2</sub>
1862	Exhibition	The Catalogue of the Paris Exhibition 1862 Central Provinces wood with bars 3 x 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>2</sub>
1878	187	Wallch No 187 with Ceylon wood
1878	average	Smithies in 1878 found the average of our specimens to be

For the purpose of this study, the following definitions were used:

C	1163	Ahui Central Provinces
C	1412	S and Central Provinces
G	2747	Jamui Bihar
G	1239	Gunsur Madras
C	1301	D 1069 North Arcot
N	20	Salem Collection
N	8	Ceylon Collection
No	62	

11 CEBRELA, Linn

Bes des the o two species Kurz gives *C. multijuga* Kurz: 228 Venn Young da ma, as a large rather rare evergreen tree of 12 ft  
Wood light, soft, red, no heartwood Annual rings marked by a continuous belt of larger pores Pores prominent on a vertical section Medullary rays distant  
1 C Toona, Roxb, Hook, Fl Ind, 568, Kurz Fl Ind, 615, Boddome & 10, Brandis 72, Kurz: 228, Gamble 16 The Toon Tree





## 10 CHLOROXYLON, DC

1 C Swietenia, DC, Hook Pl Ind 1 569, Beddome t 11, Brandis 74 Swietenia Chloroxylon, Roxb Pl Ind n 400 Salin Wood Vern Behia, girya, behru, viki, C P, Madanad, Tam, Billu, bilgu, Tel, Burus, gurus, Jam, Behru, Uruya, Haida, dheria, Mar, Muragalu, Mysore, Burute, nal burute Cingh  
A moderate sized deciduous tree Bark  $\frac{1}{2}$  inch thick, soft, spongy, light grey or yellow Wood very hard, yellowish brown, the inner wood of a darker colour, but no distinct heartwood, with a beautiful satiny lustre, seasons well Annual rings distinct Pores very small Medullary rays fine, uniform and equidistant, very numerous, distinctly visible on a radial section as shining irregularly shaped plates, the distance between the rays is greater than the transverse diameter of the pores  
Central and South India and Ceylon  
Growth slow 16 rings per inch of radius The following experiments have been made to determine the weight and transverse strength —

We the Value of P		found		65 lbs	
Baker in 1829 with Madras wood 3 experiments					
w th bars $6 \times 2 \times 2$					
A Mendis No. 8, with Ceylon wood with bars					
$2 \times 1 \times 1$					
A Mendis No. 52 w th Ceylon wood with bars					
$2 \times 1 \times 1$					
Skinner No. 47 with Madras wood					
$2 \times 1 \times 1$					
Puckle (Balfour p 317) with West Mysore wood					
3 experiments with bars $2 \times 1 \times 1$					
The Catalogue of the Paris Exhibition 1862					
Central I rovinces wood with bars $3 \times 1 \times 1$					
Wall ch No 187 with Ceylon wood					
Smaythes in 1878 found the average of our specimens to					
Give					
The wood is used for					
frames In Madras					
under water It has been found suitable for turning It is imported into England for					
cabinet work and the backs of brushes					

C 1163	Al in Central Provinces	66
C 1412	Seoni Central Provinces	61
C 2742	Jamui Betar	61
C 1230	Gummar Madras	66
D 1069	North Arcot	66
No 20	Salem Collection	66
No 8	Ceylon Collection	66
No 62		66

## 11 CEDRELA, Linn

Besides these two species Kurz gives *C multigula* Kurz 1 228 Vern *Toung da-ma*, as a large rather rare evergreen tree of Pegu.

Wood light, soft, red, no heartwood Annual rings marked by a continuous belt of larger pores Pores prominent on a vertical section Medullary rays distant

1 C Toona, Roxb, Hook Pl Ind 1 568, Roxb Pl Ind 1 635, Beddome t 10, Brandis 72, Kurz 1 228, Gamble 16 The Toon Tree.

*Vern. Tla, tlan, tin, maha nim, Hind.; Tuni, tan, kad, Beng.; Maha timbu*  
*Urya; Mahan, Satpuras; Drai, Pb.; Tuni, bobich, lalski, Nep.; Simat*  
*Leopha; Poma, hendur poma, Ass.; Sili, mli, Salem; Kal kilung; Nil-*  
*giris; Sandant vamb, Vinaveilly; Tundu, kemp gaudagheri, Kan.; Noge,*  
*belandi, Coorg; Deodari, Kuruk, Mar.; Chikado, Iselkado, Magh;*  
*Shurwbed, Chakma; Thitkado, Burm.*  
 A large tree. Bark thin, dark grey or reddish brown, exfoliating when  
 old in irregular woody scales. Wood brick-red, soft, shining, even but  
 open-grained, fragrant, seasons readily, does not split nor warp. Annual  
 rings distinctly marked by a belt of large and numerous pores. Pores fre-  
 quently double or subdivided, unequally distributed, scanty in the autumn  
 wood, somewhat unequal in size, prominent on a vertical section; those  
 in the spring wood larger. Medullary rays red, fine and moderately  
 broad, uniform; the distance between the rays generally equal to the  
 transverse diameter of the pores.

Sub-Himalayan forests, Bengal, Burma, South India; ascending in the North-West  
 Himalaya to 3,000 feet, in Sikkim to 7,000 feet.  
 Growth rapid: Brandis says that in 1863 he measured the following trees on the  
 Eastern Juma Canal near Saharanpur:—

Age 30 years, girth 58 inches, mean of 6 trees.

" 35 " " 86 " " 5 " "

" 35 " " 86 " " 5 " "

" 35 " " 86 " " 5 " "

" 35 " " 86 " " 5 " "

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Experiment by whom conducted.	Year.	Wood whence procured.	Number of experiments.	Size of bar.	Weight.	Value of P.
Chlorid	1863	Bengal	3	6 x 2 x 2	31	360
Campbell	1831	Assam	3	6 x 2 x 2	35	423 (unseasoned).
Kyd	1831	Assam	3	6 x 2 x 2	31	360
Cunningham	1831	Assam	3	6 x 2 x 2	31	360
Skinner, No. 15	1831	Assam	3	6 x 2 x 2	31	360
Baker	1831	Assam	3	6 x 2 x 2	31	360
Fowke	1831	Assam	3	6 x 2 x 2	31	360
Brandis, No. 25	1831	Assam	3	6 x 2 x 2	31	360
R. Thompson	1831	Assam	3	6 x 2 x 2	31	360
Wallich, Nos. 39 and 40	1831	Assam	3	6 x 2 x 2	31	360
Hamilton	1831	Assam	3	6 x 2 x 2	31	360
Smythies	1831	Assam	3	6 x 2 x 2	31	360

The wood is durable and is not eaten by white ants; it is highly valued and univer-  
 sally used for furniture of all kinds, and is also employed for door panels and carving.  
 From Burma it is exported under the name of 'Moulmein Cedar,' and as such is  
 known in the English market. It there fetches about Rs. 65 per ton, the cost of  
 cutting and delivery being Rs. 44, according to Major Seaton. In North-West India  
 it is used for furniture, carvings and other purposes. In Bengal and Assam it is the  
 chief wood for making ten-boxes, but is getting scarce on account of the heavy demand.  
 The Bhutias use it for shingles and for wood carving, they also hollow it out for rice  
 pounders. It is, or rather used to be, for very large trees are now rather scarce, hol-  
 lowed out for dug-out canoes in Bengal and Assam. In Bengal, Assam and Burma  
 it grows to a very large size, trees 20 feet girth with a height of 80 to 100 feet of  
 clear stem being not uncommon in forests which have been only little worked like  
 those in Dumsong and in some parts of the Chittagong Hill Tracts. At page 91 of

the Ind in Forester Vol : the cube contents of 4 trees in the Khyang Valley

freely The leaves are used to feed cattle and the flowers yield a red or yellow dye (Gulart) The bark is astringent and gives a resinous gum it is also used as a febrifuge

P 1191	Madhopur Punjab	lbs
H 8	Siala Punjab	35
H 5	Barnur Punjab	37
O 214	Garhwal 1868	36
C 177	Mindia Central Provinces 1871	37
E 360	Tulsh Darjeeling 5000 ft	34
E 2333	Darjeeling 6000 ft	34
E 605	Bamunpore Darjeeling Terai	30
E 2332	Sukna Darjeeling 2000 ft	36
I 640	Kamrup Assam	44
E 1266	Tezpur Assam	31
E 1229	Shibgar Assam	31
E 712	Chitragong	39
D 1054	Salem Madras	39
W 763	South Kanara	29
B 272	Burma 1867	30
B 803	Tharawadd Burma	38
No 18	Salem Collection	30
No 19	(marked <i>Chickrassia tabularis</i> )	37

2 C serrata, Royle, Brandis 73 Kurz : 229 C Toona, Roxb, Hook, Pl Ind : 568 (in part) Vern *Draei, daili, dal, dauri, kishing, Alham N W Him*

A tree Bark dark grey,  $\frac{1}{2}$  inch thick, with regular longitudinal furrows Heartwood light red, even, but open grained, fragrant Annual rings distinctly marked by broad belts of numerous large pores often double or divided into three compartments, unequal in size, and unequally distributed, very prominent on a vertical section, scanty and small in autumn wood, large and very numerous in spring wood Medullary rays fine and moderately broad

North West Himalaya up to 8000 ft Growth moderate, 10 rings per inch of radius consequently slower than that of Average weight 31 lbs per cubic foot Wood used for many purposes about Simla also for the hoops of sieves and for bridges The shoots and leaves are lopped for cattle fodder

H 3181	Dungagali Hazara 6000 ft	lbs
H 920	Hazara, Punjab 6000 ft	38
H 897	Murree Punjab 7000 ft	29
H 782	Saidu Chamba 6000 ft	28
H 20	Malyana Simla 7000 ft	31
H 130	Deoban Jamsar, 6500 ft	30

H 502 sent from the Andaman Islands under the name of *Vern Thakado* Burm Pada And has a reddish moderately which seasons well Pores large scanty often subdivided vertical section Medullary rays numerous fine uniform the rays in any times less than the transverse diameter of the pores to *Meliacca*, but cannot at present be identified

## ORDER XXVIII. CHALITTIACEÆ.

An Order containing one Indian genus, *Chaillatia*, with three species: *C. gelonoides*, Hook. f.; Hook. Fl. Ind. i. 570; Beddome lxx; Kurz i. 230 (*Moacurva* *gelonoides*, Kurz. f.; Hook. Fl. Ind. ii. 69.) Vern. *Moacurva*, Beng., is a small tree of Eastern Bengal, South India and Burma; *C. Helfferiana*, Kurz; and *C. longipetala*, Turcz (*C. macropetala*, Turcz; Kurz i. 231), are evergreen shrubs of Tenasserim.

## ORDER XXIX. OLACINEÆ.

An Order which contains about 19 or 20 genera of Indian trees, shrubs or climbers, including about 40 species. They are chiefly found in the moist zones of Eastern Bengal, Burma and the Western Ghats. But little is known of the qualities and uses of their wood.

The Order is divided into 4 Tribes, viz. :—

- Tribe I.—OLACEÆ  
 " II.—OPIACEÆ  
 " III.—LEACINEÆ  
 " IV.—PHYTOCENEÆ

*Ximenia americana*, Willd.; Hook. Fl. Ind. i. 574; Roxb. Fl. Ind. ii. 252; Kurz i. 232. Vern. *Uranechra*, Tel.; *Pinkaysee*, Burm., is a straggling shrub of South India, Tenasserim and the Andamans, with a substitute for Sandal.

*E. populifolium*, Mast.; Hook. Fl. Ind. i. 578; Kurz i. 234; Gamble 18, of Travancore; and *E. scandens*, Bl.; Hook. Fl. Ind. i. 578; Kurz i. 234; Gamble 18, of the North-East Himalaya, Khasia Hills, Eastern Bengal and Burma.

*Strombosia* contains 2 large trees: *S. javanica*, Gardn.; *A. densiflora*, Beddome t. 137, of the Western Ghats. *Anacolosia* includes four trees: *A. ceylanica*, Gardn.; *A. villosa*, Mast.; Hook. Fl. Ind. i. 580; *A. puberula*, Kurz i. 235, of Tenasserim; and *A. puberula*, Kurz i. 235, of Tenasserim.

*Schöpfia*, Kurz i. 235, of the Khasia Hills; *A. Griffithii*, Mast.; and *A. puberula*, Kurz i. 235, of Tenasserim and the Andamans.

*Schöpfia fraxinea*, Wall.; Hook. Fl. Ind. i. 581, is a small tree of Nepal and the Khasia Hills; and *S. acuminata*, Wall., of Assam, the Khasia Hills and Sylhet.

*Canstera Rheedii* Gamelin; Hook. Fl. Ind. i. 582; Brandis 75; Beddome clxxx.; Kurz i. 237 (under Thymelacaceæ) (*C. scandens*, Roxb. Fl. Ind. i. 441), is a large evergreen climbing shrub of Oudh, Southern India and Burma.

*Leptomeria*, Kurz i. 330 (under Santalacæ) is a small tree of the North-East Himalaya and Eastern Bengal. *Opilia amentacea*, Roxb. Fl. Ind. ii. 87; Hook. Fl. Ind. i. 583; Beddome lx.; Kurz i. 238 Vern. *Baleekoma*, Tel., is a scandent shrub or small tree of South India and Burma.

Of *Gomphandra*, there are two South Indian trees: *G. axillaris*, Wall.; and *G. polynorpha*, Wight; Beddome lxi.; while 3 species, *G. penangiana*, Wall.; *G. affinis*, Mast.; and *G. tomentella*, Mast, all under *Stemonurus* in Kurz i. 339, 340, occur in Tenasserim.

*Apodytes Benthamiana*, Wight; Beddome t. 140, is a tree of the Western Ghats; and *A. undamiana*, Kurz i. 239, a tree of the Andaman Islands. *Mappia* contains 4 species from South India, *M. foetida*, Miers; Beddome t. 141, being common on the Nilgiris.

*Phytocrene gigantea*, Wall.; Hook. Fl. Ind. i. 591; Kurz i. 241, is a gigantic climber of the forests of Chittagong and Burma, whose stem on being cut gives out a quantity of fresh water good for drinking; the structure of its wood is very curious. Of *Aliguelia*, 240-241) contains 2 Burmese trees.

*Phytocrene gigantea*, Wall.; Hook. Fl. Ind. i. 591; Kurz i. 241, is a gigantic climber of the forests of Chittagong and Burma, whose stem on being cut gives out a quantity of fresh water good for drinking; the structure of its wood is very curious. Of *Aliguelia*, 240-241) contains 2 Burmese trees.

there are two climbing shrubs *M. Kienii*, Gleason, of Assam, and *M. dentata*, Beddome, of the Anamalai Hills. *Sarcostigma* and *Lodes* contain also climbing shrubs of little interest. *Natalium herpetium*, Ham, Hook. Fl. Ind. 1 696, Kurz 1 243, Gamble 18 Vern Sanguo, Lepcha, is a common climber throughout Eastern Bengal and Burma.

1. OLAX, Linn.

he one described, one is found in Southern India, *O. acuminata*, Wall, in Eastern India, and one, *O. nana*, Wall, Brandis 75.

1. *O. scandens*, Roxb. Fl. Ind. 1 168, Hook. Fl. Ind. 1 575; Brandis 75; Kurz 1 213 Vern. *Dhenuan*, Hind; *Koko-aru*, Beng; *Kurpodur*, muki malle, *turka-vepa*, Tel., *Harduli*, *archiri*, Mar.; *Laidoo*, Burm.  
A large rambling shrub, sometimes a climber. Bark grey, 1 inch thick. Wood porous, yellowish white, soft. Pores numerous, large and moderately sized, uniformly distributed, often oval. Medullary rays fine, numerous, not prominent.  
Sub Himalayan tract in Kumaun, Behar, Central and South India, Burma

Weight, 38 lbs per cubic foot The fruit is used in Hazaribagh for making sherbet.  
C 1184 Aburi Reserve, Central Provinces . . . . . 40 lbs  
C 2762 Moharli " " " " " 36 lbs

2. DAPHNIPHYLLOPSIS, Kurz.

1. *D. capitata*, Kurz in Journal As Soc Cile, 1875, p 201, For. Fl. B. Burma 1 210, Gamble 18 *Ilex daphniphyloides*, Kurz; Hook. Fl. Ind. 1 606. Vern *Kalay, chilanni*, Nep, *Tumbung*, Lepcha.  
A large tree Wood grey, soft, even-grained Pores small, often in short radial lines between the fine and very numerous straight medullary rays.  
Forests of the Sikkim Himalaya above 6,000 feet, and of Marlaban between 4,000

ORDER XXX. ILICINÆÆ.

An Order containing only one Indian genus

1. ILIX, Linn

A genus of 21 Indian species, of which 11 are found in the Eastern Himalaya and Khasi Hills, 3 in the North-West Himalaya, 6 in Burma, and 1 in South India. The following list is taken from the Flora Indica, pp 698 to 606 —

- |   |                            |
|---|----------------------------|
| 1. <i>I. insignis</i> , Hook. f. . . . .                    | Sikkim, 7,000 feet.        |
| 2. <i>I. dipetala</i> , Wall . . . . .                      | Himalaya, Simla to Sikkim. |
| 3. <i>I. odorata</i> , Ham . . . . .                        | Simla to Nepal.            |
| 4. <i>I. malabarica</i> , Beddome . . . . .                 | Western                    |
| 6. <i>I. Wilkersonii</i> , Wright and Arn., Used lower Ind. | "                          |

6. *I. denticulata*, Wall. . . . . Western Ghats, Sikkim, Khasia, Tenasserim.  
 7. *I. theaeifolia*, Wall. . . . . Khasia Hills.  
 8. *I. embeloides*, Hook. f. . . . . Assam, Sylhet.  
 9. *I. Grevillei*, Hook. f. . . . . Eastern Himalaya, Khasia.  
 10. *I. Thomsoni*, Hook. f. . . . . Eastern Nepal and Sikkim,  
 11. *I. intricata*, Hook. f. . . . . 10,000 to 11,000 feet.  
 12. *I. favigilis*, Hook. f. . . . . Eastern Himalaya, Khasia.  
 13. *I. venulosa*, Hook. f. . . . . Khasia Hills.  
 14. *I. Garudneriana*, Wight; Beddome lxii. . . . . Nilgiris.  
 15. *I. Wightiana*, Wall. . . . . " Himalaya, Khasia.  
 16. *I. excelso*, Wall. . . . . Eastern Sub-Himalaya,  
 17. *I. Godajam*, Colebr. . . . . Burma.  
 18. *I. sulcata*, Wall. (*I. Godajam*, Kurz i. 245, part)  
 19. *I. macrophylla*, Wall.; Kurz i. 246 . . . . . Tenasserim.  
 20. *I. cymosa*, Bl.; Kurz i. 246 . . . . . "  
 21. *I. Wallichii*, Hook. f.; Kurz i. 246 . . . . . "

Pores small, arranged in radial lines or irregular elongated patches. Medullary rays of two classes, fine and broad, prominent on a vertical section, and generally darker coloured than the fibrous tissue, giving the wood a mottled appearance.

1. *I. diphyrena*, Wall.; Hook. Fl. Ind. i. 599; Brandis 76; Gamble 18. Vern. *Shangala*, *kandlar*, *kalicho*, *kinsa*, *dodru*, *drunda*, Pb.; *Kaula*, *karpur*, *munasi*, *gulsima*, Nep.; *Kandara*, *kadera*, *kateru*, Simla. A small evergreen tree. Bark dark, rough. Wood white, hard, close-grained. Pores extremely small, in long irregular wavy radial lines. Medullary rays short, moderately broad to broad, prominent on a radial section, giving the wood a mottled appearance.

Himalaya, from the Indus to Bhutan, above 5,000 feet. Weight, 46 lbs. per cubic foot.

H 21. *Matiyana*, Simla, 7,000 feet . . . . . lbs. 46

2. *I. theaeifolia*, Wall.; Hook. Fl. Ind. i. 601. *I. gaultheriifolia*, Kurz i. 245.

A moderate-sized evergreen tree. Wood white, soft, close-grained, with white concentric lines, which seem to correspond to annual rings. Pores very small and numerous. Medullary rays very fine and broad; the latter short, scanty, prominent, giving the wood on a vertical section a beautifully reticulate appearance.

Darjeeling and Khasia Hills and Tenasserim. Weight, 39 lbs. per cubic foot.

H 692. Chuttockpur, Darjeeling, 6,000 feet . . . . . lbs. 39



1. *KNONGNYS*, Linn.

A genus of about 24 Indian species, of which many are merely small shrubs or climbers. About 11 occur in the Eastern Himalaya, Assam and Eastern Bengal, 5 in the North-West Himalaya, 5 in Burma and 7 in South India. Among them, *E. ovalatus*, Wall.; Hook. Fl. Ind. i. 608; Beddome t. 141, of the Nilgiris, and *E. glaber*, Roxb. Fl. Ind. i. 628; Hook. Fl. Ind. i. 609; Kurz i. 218, of Chittagong and Burma, may be mentioned as most important. *E. echinatus*, Wall.; Hook. Fl. Ind. i. 611; Brandis 80; Gamble 18, is a small climbing or epiphytic shrub of the Himalaya from the thelam to Sikkim at 7,000 to 12,000 feet. The wood of some species may be worth trying as a substitute for boxwood.

Wood compact, even-grained, white. Pores very or extremely small. Medullary rays very fine and very numerous.

The first four species here described are common in the North-West Himalaya, and may thus be distinguished:—

Leaves membranous	{	Leaves deeply cut	<i>E. lacerus</i> .
		" slightly cut	<i>E. Hamiltonianus</i> .
		Leaves long, sharply serrate	<i>E. pendulus</i> .
		" short, obtusely serrate	<i>E. tingens</i> .

1. *E. lacerus*, Ham.; Brandis 78. *E. grandiflorus*, Wall.; Hook. Fl. Ind. i. 608. Vern. *Siki*, *pallali*, *papur*, *banchhi*, *dulhapar*, *nanchu*, *pash*, *maru*, *chikan*, *rangchhal*, *kioch*, *Punjab*; *Gule*, *grui*, *Simla*.

A small deciduous tree with smooth grey bark. Wood white, moderately hard, exceedingly compact, close and even-grained. Annual rings visible, but not very distinct. Pores extremely small, barely visible under the lens. Medullary rays extremely fine.

Himalaya, from the Indus to Sikkim, between 6,000 and 11,000 feet.

Weight, 48 lbs. per cubic foot. Wood used for carving. The seeds are strung as beads in Bassahir and used for necklaces.

H 67.	Nagkanda, Simla, 9,000 feet.	lbs.
H 2883.	" "	48
H 3011.	" "	46
H 3187.	Dungagalli, Hazara, 8,000 feet	49

2. *E. Hamiltonianus*, Wall.; Hook. Fl. Ind. i. 612; Brandis 78. *E. alpinus*, Roxb. Fl. Ind. i. 627. Vern. *Siki*, *singi*, *chual*, *wadal*, *papur*, *rithu*, *rundi*, *brachmani*, *banchhor*, *kurin*, *skioch*, *siddhera*, *naga*, *Pb.*; *Agnun*, *agnu*, *Kumman*.  
A large deciduous shrub, or small or occasionally moderately-sized tree. Bark thick, grey, corky, with deep irregular fissures. Wood white, with a slight yellow tinge, soft, close-grained. Annual rings marked by a narrow belt of firm wood with fewer pores.

Outer Himalaya, from the Indus to Bhutan, Khasia Hills, from 4,000 to 8,000 feet. Weight, 35 lbs. Wood used for carving into spoons.

H 3173.	Dungagalli, Hazara, 8,000 feet.	lbs.
H 919.	Hazara, Punjab, 8,000 feet	36
H 172.	Murree, Punjab (1866), 7,000 feet	34
H 778.	Kalatoop Forest, Punjab, 7,000 feet	44
H 2897.	Nagkanda, Simla, 9,000 feet	
H 3012.		

3. *E. pendulus*, Wall.; Hook. Fl. Ind. i. 612; Brandis 79, Vern. *Chopra*, *pincha*, *garwi*, *kunku*, N. W. P.



A moderate-sized evergreen tree with grey, rather corky bark, 1 inch thick. Wood white, moderately hard, compact, with a light red tinge, very close and even grained. Annual rings marked by an almost continuous line of pores. Pores very small, very numerous. Medullary rays extremely fine, very numerous.

Himalaya from the Jhelum to Nepal between 2500 and 7500 feet. Weight 35 to 41 lbs per cubic foot.

II 86 The Glen Simla, 6000 feet. 35 lbs.

41

4  
Aungku  
A  
inner ba  
*Laonynnus lacertus*, except that the wood of this species has a slightly reddish tinge.  
Brands 79 Vern  
*nei makau*, Simla  
outside and yellow  
I are the same as in  
this species has a slightly reddish tinge.

0000 feet from the other 3 species

H 32 Madhan Simla 7000 feet  
H 2814 Mahasu Simla 8000 feet  
H 2881 Nagkanda Simla 8000 feet

48  
46

5 E theaeifolius, Wall, Hook II Ind 1 612, Gamble 18  
A shrub with wood of structure similar to the rest, but the medullary rays are somewhat broader and the annual rings more distinct.

E 3308 Kangbul, Darjeeling 7500 feet

## 2 LOPHOPETALUM, Wright

much 6 are Burmese, 1 from  
*L. himalaia* n Wright is a  
moderately, Syllit and Tenas  
Wood light, soft to moderately hard, even grained, somewhat shining. Pores small to moderate sized. Medullary rays very fine, very numerous, traversed by concentric bands of softer texture.

1 L littoralis, Kurz 1 255 *Kokoona littoralis*, Lawson, Hook.  
II Ind 1 617 Vern Moondein, Burma  
A tree Wood grey, moderately hard, even grained. Pores small and moderate sized, often oval and subdivided. Medullary rays very fine, uniform and equidistant, very numerous, the distance between the rays much less than the transverse diameter of the pores. Medullary rays traversed by numerous parallel, concentric, wavy lines, which have the appearance of interrupting the rays, thus forming a succession of wavy, concentric bands.

Pegu and Tenasserim  
Weight on an average 35 lbs per cubic foot

B 278 Burma (1867)  
B 213 (1867)  
B 2300 Andaman Islands (1866)

11  
30  
7  
11

2. *C. spinosus*, Royle; Brandis 80. *Gymnosporia Royleana*, Wall.; Hook. Fl. Ind. i. 620. Vern. *Dzawal*, Trans-Indus; *Kandu*, *kandidari*, *natakzi*, *lei*, *ghipari*, *badlo*, *kadevar*, Pb.; *Kura*, *bagrawala darim*, *gudala darim*, N.-W. P.

A thorny shrub, with thin, grey, corky bark. Wood lemon-coloured, hard and close-grained, with numerous white, concentric bands. Pores very small. Medullary rays very fine, very numerous. It cuts like boxwood, for which it may become a substitute.

Outer North-West Himalaya  
Weight, 49 lbs The wood deserves attention as possibly suitable for carving and engraving

P 913	Salt Range, Punjab	49
P 2932	Sumi, Sumis, 3,000 feet	49

3. *C. senegalensis*, Lam., Beddome lxxvi., Brandis 81; Kurz i. 252. *C. montana*, Roxb Fl. Ind. i. 620 *Gymnosporia montana*, Lawson; Hook. Fl. Ind. i. 621 Vern *Sherazane*, Trane-Indus, Takkat, daykar, *mareila*, kingaro, *khara*, Pb, *Baikal*, *gajachinni*, C. P.; *Alal kangom*, Bombay, *Danta*, *babur*, Gondi, *Dhatti*, Bhill, *Bharatti*, *gchal*, Mar.; *Danti*, *dantani*, *pedla chinta*, Tel.

A tall spinescent shrub. Bark  $\frac{1}{2}$  inch thick, grey, with longitudinal cracks, exfoliating in small scales. Wood pinkish white, soft but close-grained; no heartwood, no annual rings. Pores small, numerous, uniformly distributed. Medullary rays very fine, very numerous. Faint concentric bands.

Northern dry and intermediate zones North-West India, ascending to 4,000 feet, d The leaves are used

C 1162	Ahri Reserve, Central Provinces	46
C 2762	Mohabli "	46

#### 4. ELÆODENDRON, Jacq fl.

1. *E. Roxburghii*, W. and A.; Beddome t. 148, Brandis 82, Gambic 19 *E. glaucum*, Pers., Hook. Fl. Ind. i. 623; Roxb. Fl. Ind. i. 638. *Nerija dichotoma*, Roxb. Fl. Ind. i. 616. Vern. *Alirandu*, *padrinu*, *bakra*, *janwa*, Pb.; *Bakra*, *shauria*, *chani*, *daberi*, *manari*, N.-W. P.; *Chauri*, *metkur*, Oudh; *Chikyang*, *Lepcha*; *Jamrasi*, *kala mukha*, *tohi*, C. P., *Dhakka*, *musur*, Gondi, *Niru*, *Kurku*; *Aran*, *tamru*, *Mar*, *Bala*

sided very small scales. Wood moderately hard, even- and close-grained, works and polishes well, light brown, often with a red tinge; the outer wood white, but no distinct sapwood; no annual rings. Numerous, wavy, concentric, lighter-coloured bands. Pores small, numerous. Medullary rays fine, very numerous, visible on a radial section.

Sub-Himalayan tract from the Ravi eastward, Central and South India (C. P. List), our specimens give an average of 53 lbs. *Shinner*, No 65, gives weight, 10 to 60 lbs. (Lrandis), 46 (*Shinner* and *Fowle*), 53 (*H. Thompson*), 10

A thorny shrub, with thin, grey, corky bark Wood lemon coloured, hard and close grained, with numerous white, concentric bands Pores very small Medullary rays very fine, very numerous It cuts like boxwood, for which it may become a substitute

Outer North West Himalaya

Weight 49 lbs The wood deserves attention as possibly suitable for carving and engraving

P 913 Salt Range Punjab  
P 2932 Suni Simla 3000 feet

lbs  
49  
49

3 *C. senegalensis*, Lam, Beddome lxvi, Brandis 81, Kurz 1 252  
*C. montana*, Roxb Fl Ind 1 620 *Gymnosporia montana*, Lawson,  
Hook Fl Ind 1 621 Vern *Sherawane*, Trans-Indus, *Talkar*, *daykar*,  
*mareila*, *kingaro*, *tharar*, Pb, *Baikar*, *gajachinni*, C P, *Mal kangoni*,  
Bombay, *Danta*, *babur*, Gond, *Dhatti*, Bhil, *Bharatti*, *yekal*, Mai,  
*Danti*, *dantausi*, *pedda chintu*, Tel

A tall spinescent shrub Bark  $\frac{1}{8}$  inch thick, grey, with longitudinal  
cracks, exfoliating in small scales Wood pinkish white, soft but close  
grained, no heartwood, no annual rings Pores small, numerous,  
uniformly distributed Medullary rays very fine, very numerous  
Tint concentric bands

North West India ascending to 4000 feet  
insula

usable but not used The leaves are used  
for fodder and the branches as well as the roofs of houses

C 1162 Ahiri Reserve Central Provinces  
C 2752 Moharli

lbs  
46

#### 4 ELÆODENDRON, Jacq fil

1 *E. Roxburghii*, W and A, Beddome t 148, Brandis 82,  
Gamble 19 *E. glaucum*, Pers, Hook Fl Ind 1 623, Roxb Fl Ind 1  
638 *Neerija dichotoma*, Roxb Fl Ind 1 646 Vern *Mirandu*, *padriun*,  
*bakra*, *janwa*, Pb, *Bakra*, *shauria*, *ekauli*, *daberi*, *mamri*, N W P,  
*Chauri*, *metkur*, Oudh, *Chikyang*, Lepcha, *Jamraai*, *kala mukha*, *rohi*,  
C P, *Dhakka*, *msur*, Gond, *Niru*, Kurku, *Aran*, *tamruj*, Mai, *Bata*  
*karas*, Bhil, *Karkara*, *irkuli*, *selupa siri*, Tam, *Nirya*, *neradi*, *botanslam*,

Cingh

, exfoliating in 4  
and close grained,  
works and polishes well, light brown, often with a red tinge, the outer  
wood  
conceal  
rays fine  
Medullary

O 235.	Garhwal (1868)	. . . . .	lbs.
O 2991.	" (1874)	. . . . .	56
C 183.	Mandla, Central Provinces (1870)	. . . . .	48
C 1182.	Ahiri Reserve, Central Provinces	. . . . .	50
C 2781.	Melghát, Berar	. . . . .	55
E 2335.	Bamunpokri, Darjeeling Terai	. . . . .	49
No. 63.	Ceylon Collection	. . . . .	57
			56

## ORDER XXXII. RHAMNEÆ.

Contains twelve Indian genera, of which six are climbing or straggling shrubs and the remainder shrubs or small trees. The Order is subdivided into four Tribes:—

Tribe	I.—Ventilaginææ	. . . . .	<i>Ventilago</i> and <i>Smythea</i> .
"	II.—Zizyphææ	. . . . .	<i>Zizyphus</i> and <i>Berchemia</i> .
"	III.—Rhamnææ	. . . . .	<i>Rhamnus</i> , <i>Hovenia</i> , <i>Scutia</i> , <i>Sageretia</i> , and <i>Colubrina</i> .
"	IV.—Gouaniææ	. . . . .	<i>Apteron</i> , <i>Gouania</i> , and <i>Helinus</i> .

Of the genera not here described, *Smythea* and *Apteron* are scandent shrubs of Tenasserim. *Hornia dulcis*, Thunb.; Hook. Fl. Ind. i. 640; Roxb. Fl. Ind. i. 630; Brandis 94. Vern. *Chamhūn*, Punjab, is a tree commonly cultivated throughout the Himalaya, with a light-coloured, coarse and open-grained wood, and an edible fruit with a flavour like that of the Bergamot Pear. *Scutia indica*, Brongn.; Hook. Fl. Ind. i. 640; Kurz i. 268, is a straggling shrub of Burma and South India. *Colubrina* contains three species, of which *Colubrina asiatica*, Brongn.; Hook. Fl. Ind. i. 642; Beddome lxix.; Kurz i. 268. (*Ceanothus asiaticus*, Roxb. Fl. Ind. i. 615.) Vern. *Kway-nway*, Burm., is a large shrub of the coast forests of Burma and Malabar. *Gouania* contains three climbing shrubs, commonest among which is *G. leptostachya*, DC.; Hook. Fl. Ind. i. 643; Kurz i. 269; Gamble 19. Vern. *Kalalag*, Kumaun; *Batwasi*, Nep.; *Khauta*, Orissa; *T...*, Burm., a large climber of the Eastern Himalaya, Burma and South India. *...* *lanceolatus*, Brandis 574, is a slender twining shrub of the outer North-West Himalaya, ascending to 4,000 feet.

Wood hard or moderately hard. Pores small or moderate-sized. Medullary rays fine or very fine, numerous, equidistant.

### 1. ZIZYPHUS, Juss.

A genus containing 13 Indian species, 7 of which come from Northern and Central India, about 6 from South India, 4 from Burma, and 6 from the North-East Himalaya and Assam. Six species are here described. Of the remainder, the chief is *Z. vulgaris*, Lamk.; Hook. Fl. Ind. i. 633; Roxb. Fl. Ind. i. 609; Brandis 85. Vern. *Sinjli*, *simli*, *ban*, *ber*, *kandika*, *kandiāri*, Hind., a small tree of the arid and northern dry zones. It is found in the outer Himalaya from the Indus to the Ravi, ascending to 6,500 feet, cultivated in the Punjab, Beluchistan, and Bengal, and semi-wild as far as Italy and the south of France—*Mathieu Fl. For.* p. 60. Its fruit is eaten.

Wood reddish, moderately hard or hard; no heartwood. Pores small to moderate-sized, often subdivided, between numerous fine or very fine medullary rays, the distance between the rays being less than the diameter of the pores.

1. *Z. Jujuba*, Lam.; Hook. Fl. Ind. i. 632; Roxb. Fl. Ind. i. 608; Beddome t. 149; Brandis 86; Kurz i. 266; Gamble 19. Vern. *Bér*, *baer*, *beri*, Hind.; *Kál*, *bér*, Beng.; *Zeeben*, Burm.; *Rengha*, *regi*, Tel.; *Yellande*, Tam.; *Bhor*, Mar.; *Renga*, Bhíl; *Eleutha*, Mal.; *Yelchi*, Kan.

A moderate-sized deciduous tree, almost evergreen. Bark  $\frac{1}{2}$  inch thick, dark grey, nearly black, with long, deep, irregular cracks. Wood hard, reddish; no heartwood, no annual rings. Pores small or moderate-sized, scanty, often oval and subdivided. Medullary rays fine and very numerous, uniform and equidistant; the distance between two rays much less than the transverse diameter of the pores. Pores frequently joined by very fine, wavy, interrupted, concentric lines.

purposes. The fruit is commonly eaten and is much improved by cultivation.

		lbs
O 265	Garhwal (1868)	
C 2815	Melghát, Berar	
C 1128	Ahri Reserve, Central Provinces	43
D 1071	North Arcot, Madras	52
P 885	from Multán, sent under the name of <i>Z. flexuosa</i> , has the same structure as <i>Z. Jujuba</i> , but the pores are round and moderate sized. Weight, 43 lbs	

2. *Z. nummularia*, W. and A.; Hook. Fl. Ind. i. 633, Beddome lxi.; Brandis 88. *Z. microphylla*, Roxb. Fl. Ind. i. 613. Vern. *Kailanna*, Afgh.; *Malla, bér, birár, jharí, kanta*, N.-W. P.; *Gangr, jangra*, Sind; *Parpail gidda*, Kan.

A thorny shrub with grey bark. Wood yellow, hard, compact. Structure similar to that of *Z. Jujuba*, except that the pores are larger and the medullary rays are somewhat further apart; the distance between the rays is less than the transverse diameter of the pores.

Drier parts of North-West India and the Dekkan

Growth. No P 2931 shews well marked annual rings and a fast growth of 2 to 3 rings per inch of radius. Weight, 43 lbs per cubic foot on an average. It is used to make fences round fields and gardens. The leaves are threshed out and used as fodder for sheep and goats. The fruit is eaten.

		lbs
P 2931	Bhaji, Simla, 3,000 feet	41
P 3077.	Sabathu, Punjab, 3,000 feet	42
P 3093		
P 412	Ajmere	46

3. *Z. oxyphylla*, Edgw.; Hook. Fl. Ind. i. 634; Brandis 86. Vern. *Kárlun bér*, Afgh.; *Putni, Kókan ber, amlái, amna, beri, shamor*, Pb.; *Giggár*, N.-W. P.

A thorny shrub with thin brown bark. Wood white, moderately hard. Pores small, somewhat larger and more numerous on the inner edge of each annual ring. Medullary rays equidistant, very fine; the distance between the rays equal to the diameter of the pores.

Outer Himalaya from the Indus to the Ganges from 2,000 to 6,000 feet

II 2947. Suni, Sutlej Valley, 3,000 feet

4. *Z. Cenoplia*, Mill.; Hook. Fl. Ind. i. 634; Beddome lxi.; Brandis 86; Kurz i. 266. *Z. Napeca*, Roxb. Fl. Ind. i. 612. Vern. *Malas*, Hind; *Shyalál*, Beng.; *Barokols*, Uruja, Irún, C. P.; *Paranu*, Burma.

with rough, dark-grey bark. Wood amber. Concentric bands consisting

of a great mass of moderate-sized to large pores, often subdivided, between closely packed medullary rays, which bend outwards where they touch the pores, presenting a reticulate appearance.

Bengal, Burma, Central and Southern India.

Used for hedges. The fruit is eaten.

C 2753. Moharli Reserve, Central Provinces.

5. *Z. xylopyra*, Willd.; Hook. Fl. Ind. i. 634; Roxb. Fl. Ind. i. 611; Beddome lxviii.; Brandis 90. Vern. *Kat-ber*, *béri*, *goti*, *gotaha*, *kakor*, *chittania*, *sitabér*, *ghónt*, Hind.; *Goti*, Tel.; *Goti*, *bhorgoti*, Mar.; *Challe*, Kan.

A large scrambling shrub. Bark grey or reddish brown. Wood yellowish brown, hard. Pores small and moderate-sized, in patches of soft tissue which are often confluent, forming oblique bands. Medullary rays fine, equidistant, very numerous, the distance between the rays being less than the transverse diameter of the pores.

Sub-Himalayan tract from the Ganges to Nepal, Central and Southern India.

Weight, 60 lbs. per cubic foot (Skinner, No. 136); our specimen gives 49 lbs. Skinner gives  $P = 800$ . Used for carts and agricultural implements. The bark is used for tanning; the shoots and leaves for fodder. The fruit is not edible, but is used to give a black dye to leather.

C 2736.	Moharli Reserve, Central Provinces	. . . . .	lbs. 49
C 2764.	Melghát, Berar	. . . . .	...

6. *Z. rugosa*, Lam.; Hook. Fl. Ind. i. 636; Beddome lxvii.; Brandis 89; Kurz i. 265; Gamble 19. *Z. latifolia*, Roxb. Fl. Ind. i. 607. Vern. *Dhaura*, *dhauri*, Oudh; *Suran*, *churna*, C. P.; *Suran*, Mar.; *Rukh baer*, *harray baer*, Nep.

A large scrambling shrub or small evergreen tree, with rough, dark bark. Wood reddish, moderately hard, warps. Pores large and moderate-sized, oval and subdivided. Medullary rays fine, extremely numerous, uniform and equidistant, the distance between the rays much less than the transverse diameter of the pores. Pores frequently joined by very faint, wavy, concentric lines.

Sub-Himalayan tract from the Ganges eastwards, Burma, Central and Southern India.

Weight, 45 lbs. per cubic foot. Wood only used as fuel; often attacked by insects. Fruit eaten.

E 2336.	Bamunpokri, Darjeeling Terai	. . . . .	lbs. 45
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## 2. *BERCHEMIA*, Neck.

A genus which besides this species contains several erect or climbing shrubs, of which the chief is *B. lineata*, DC.; Hook. Fl. Ind. i. 638; Brandis 91, of the North-West Himalaya.

1. *B. floribunda*, Brongn.; Hook. Fl. Ind. i. 637; Brandis 91; Kurz i. 264; Gamble 19. Vern. *Kala lag*, Kumaun; *Chiaduk*, Nep.; *Rungyeong rik*, Lepcha.

A large erect or climbing shrub or small tree. Bark whitish, exfoliating and shewing a purple inner layer. Wood yellow, turning grey on exposure, porous. Pores large, oval, subdivided, between undulating moderately broad medullary rays.

Himalaya from the Jhelum to Bhutan, Khasia Hills.

E 2864. Tukdah, Darjeeling, 5,000 feet.

## 3 VENTILAGO Gaertn.

Contains 5 species of scandent shrubs Besides the one described, 2 species

1. *V. maderaspatana*, Gaertn., Hook Fl-Ind 1. 631, Beddome lxviii, Brandis 96, Kurz 1. 262 Vern *Raktapita*, Beng., *Yerra chichatti*, Tel., *Papli*, Tam., Kan., *Lokandi*, Kanwar, Bombay, *Chorgu*, Hyderabad

A large climbing shrub Bark dark grey with vertical cracks, exposing the inner-surface which has a vermilion colour. Wood greyish yellow, porous, soft, structure similar to that of *Berchemia floribunda*.

Central and Southern India and Burma

The bark is made into cordage, and a red dye is extracted from the root. It is said also to give a gum

C 2920 Central Provinces

## 4 RHAMNUS.

Contains 7

Western coast

639, Brandis

*jalidar*, Buchn

Himalaya from the Jhelum to Garhwal, *R. nepalensis* Wall., Hook Fl Ind 1. 640 Gamble 19 Vern *Achal*, Nep., is a large shrub of the Central and Eastern Himalaya and Khasia Hills, while *R. Wrightii*, W and A, is a large shrub of the higher hills of the Western Ghats

Wood generally with a brown heartwood, close grained Pores very small, arranged in oblique tails and bands which generally anastomose Medullary rays fine, numerous,

1. *R. virgatus*, Roxb Fl Ind 1. 604; Brandis 92, Gamble 19 *R. dahuricus*, Pall., Hook. Fl. Ind 1. 639 *R. hirsutus*, W. and A., Beddome lxv Vern *Phipai*, *dádúr*, *ladru*, *sela payya*, *kányi*, *mamrul*, *khomfol*, *teleon*, *gogsa*, *sindrol*, *múlni*, *niar*, *chatr*, *romúsh*, Pb., *Thalot*, *chelain*, Simla, *Tsápo*, *mail*, Tibet, Spiti, *Chato*, *chedwala*, *chadua*, Hind

A shrub or small tree, deciduous Bark thin, grey, smooth Sapwood whitish, heartwood brown, very hard and close-grained Annual rings distinctly marked. Pores very small, arranged in oblique anastomosing irregular bands of soft texture, forming an irregular net-work. Medullary rays fine, very numerous, prominent in the meshes of the net-work. The structure of the wood is the same as that of *Rhamnus catharticus*, Linn.

as firewood The fruit is

the spleen lbs

H 70 Mashobra, Simla, 7000 feet

H 2877 Naghan, Simla, 8000 "

H 3168 Dunge, all, Hazara, 7,000 "

. . . . . 57

. . . . . 63

. . . . . "



2. *R. purpureus*, Edgew. ; Hook. Fl. Ind. i. 639 ; Brandis 91. Vern. *Bat sinjal*, *tunani zanani*, *tadræ*, *tundhi*, *mimarari*, *kunji*, *chaterni*, Pb.

A large deciduous shrub, with thin smooth bark. Wood brownish grey, close-grained. Annual rings marked by an interrupted belt of pores. Pores very small, in narrow irregular radial belts of softer tissue, which often anastomose and have a reticulate appearance. Medullary rays fine, numerous, straight, prominent.

North-west Himalaya from the Indus to Nepal, between 4,500 and 10,000 feet.  
Weight, 41 lbs. Fruit used as a purgative.

H 70.	Mashobra, Simla, 7,000 feet	.	.	.	.	.	lbs.
H 2848.	Mahasu, Simla, 8,000 "	.	.	.	.	.	41
							...

3. *R. triquetrus*, Wall. ; Hook. Fl. Ind. i. 639 ; Brandis 92. Vern. *Gudlei*, Simla ; *Pagora*, *gardhan*, *phulla*, Pb. ; *Gogsa*, *ghant*, N.-W. P.

A shrub or small tree, deciduous, with thin grey bark. Wood yellowish white, moderately hard, close-grained. Annual rings distinctly marked by an interrupted belt of larger pores. Pores very small to small, arranged in irregular branching bands of softer tissue, which form fantastic patterns. Medullary rays fine and moderately broad, short.

North-West Himalaya from the Jhelum to Nepal, between 3,000 and 6,000 feet.

H 75.	Mashobra, Simla, 7,000 feet.
H 2903.	Nagkanda, Simla, 8,000 "

4. *R. procumbens*, Edgew. ; Hook. Fl. Ind. i. 640 ; Brandis 93.

A small procumbent shrub. Wood yellowish, with the same structure as that of *R. virgatus*.

Western Himalaya from Simla to Kumaun, between 7,000 and 8,000 feet.

H 2952. Naldehra, Simla, 7,000 feet.

## 5. SAGERETIA, Brongniart.

Besides the two species described, *S. oppositifolia*, Brongn. ; Hook. Fl. Ind. i. 641 ; Brandis 95. Vern. *Kanak*, *gidurdák*, *drange*, *girthan*, Pb. ; *Aglaia*, Kumaun, is a large shrub of the N.-W. Himalaya.

Wood close-grained, hard. Pores small, round. Medullary rays fine and very fine.

1. *S. theezans*, Brongn. ; Hook. Fl. Ind. i. 641 ; Brandis 95. Vern. *Dargola*, Simla ; *Drangu*, *ankol*, *kauli*, *karúr*, *phomphli*, *kánda*, *brinkol*, *chaunsh*, *katráin*, *thúm*, *kúm*, Pb.

A large spinescent shrub. Bark thin, grey. Wood very hard, white, with irregular dark-coloured heartwood. Annual rings (?) marked by white lines. Pores round, small, in rings of softer texture, uniformly distributed. Medullary rays fine and very fine, numerous.

Salt Range and Suliman Range. Western Himalaya from Kashmir to Simla, from 3,000 to 8,000 feet. Fruit eaten.

H 2946.	Suni, Sutlej Valley, 3,500 feet	.	.	.	.	.	lbs.
H 2951.	Naldehra, Simla, 7,000 "	.	.	.	.	.	...
H 3129.	Koti, Simla, 6,000 "	.	.	.	.	.	56

2. *S. Brandrethiana*, Aitch. ; Hook. Fl. Ind. i. 642 ; Brandis 95. Vern. *Ganger*, *goher*, Pb. ; *Maimúna*, Afg.

A small deciduous shrub. Bark grey, with long wrinkles. Wood yellow, very hard, close-grained. Annual rings distinctly marked by white lines and by an interrupted belt of pores. Pores small, round, numerous, between the white, fine, short, very numerous medullary rays, the distance between the rays equal to the transverse diameter of the pores.

Sulman Range and Salt Range, and North West Himalaya between the Indus and the Jhelum

The fruit is sweet and much eaten by Afghans and in the frontier districts

P 914. Salt Range, Punjab

ORDER XXXIII. AMPELIDEÆ.

The Vines of large size, and found in most parts extensively over often filled with *repanda*, W and A, and *V. latifolia*, Roxb, are the chief species of the forests

fencing and  
Himalaya,  
is a small  
lullary rays

of two kinds, very broad and fine

## ORDER XXXIV. SAPINDACEÆ.

Contains about 20 genera of Indian trees or shrubs. Most of these come from Burma or Southern India, but the largest genus *Acer*, the Maple, is almost exclusively found in the Himalaya.

The Order is divided into 4 Tribes, viz —

Tribe I—Sapindaceae . . . *Hemiglossa*, *Dittelasma*, *Erioglossum*, *Allophylus*, *Aesculus*, *Scyphopetalum*, *Cupania*, *Lepisanthes*, *Schleicheria*, *Sipindus*, *Xerospermum*, *Nephelium*, *Pometia*, *Harpullia*, *Zollinoeria*

" II —Acerineæ . . . *Acer* and *Dobinææ*  
 " III —Dodonææ . . . *Dodonææ*  
 " IV —Staphyleæ . . . *Staphylea* and *Turpinia*

F1 I

11 21

July

Fig. 10.

Anamalai Hills. *Dittelasma Rarak*, Hook. f.; Hook. Fl. Ind. i. 672; Kurz i. 297, is an evergreen tree of the Pegu Yomas and Tenasserim. *Erioglossum edule*, Blume; Hook. Fl. Ind. i. 672 (*E. rubiginosum*, Bl.; Brandis 108. *Sapindus rubiginosa*, Bl.; Beddome lxxiii.; Roxb. Fl. Ind. ii. 282. *Pancovia rubiginosa*, Baill.; Kurz i. 296) Vern. *Ritha*, Hind.; *Ishi rashi*, Tel.; *Manipangam*, Tam.; *Tseikchay*, Burm. (No. 23 Brandis' Burma List, 1862, marked *Sapindus*, 66 lbs. ex Kurz' MSS.), is a large tree of Sikkim, Assam, South India and Burma, said by Roxburgh to have a strong durable wood with a chocolate-coloured heartwood. *Scyphopetalum ramiflorum*, Hiern.; Hook. Fl. Ind. i. 676, and *Zollingeria macrocarpa*, Kurz i. 288. Vern. *Wetkyotheng*, Burm., are trees of Burma. *Cupania* contains 9 species, the chief of which are *C. glabrata*, Kurz i. 284; Hook. Fl. Ind. i. 676 (*Sapindus squamosus*, Roxb. Fl. Ind. ii. 282) of Burma and *C. pentapetala*, W. and A.; Hook. Fl. Ind. i. 678. (*Schleichera pentapetala*, Roxb. Fl. Ind. ii. 275) Vern. *Koiki-púra* ♂; *Púrakoi* ♀. Sylhet, a large tree of Sylhet; the rest are small Burmese trees. Of *Lepisanthes* there are two Burmese species; *Xerospermum Noronhianum*, Bl.; Hook. Fl. Ind. i. 686; Kurz i. 295, is a tree of the Khasia Hills, E. Bengal and Burma, while *Harpullia cupanioides*, Roxb.; Hook. Fl. Ind. i. 692 (*H. imbricata*, Bl.; Beddome t. 158), is a large tree of the Western Gháts. *Dobinæa vulgaris*, Ham.; Hook. Fl. Ind. i. 696; Gamble 23. Vern. *Samli*, Nep., is a large shrub of the Eastern Himalaya.

Wood generally soft or moderately soft, even grained; no distinct heartwood except in *Schleichera*. Pores small, or very small, generally uniform and uniformly distributed. Medullary rays very fine or fine rarely moderately broad, often closely packed. Apart from the annual rings, no concentric bands except in *Allophyllus* and *Sapindus*.

## 1. ALLOPHYLLUS, Linn.

A genus containing 2 large shrubs: that here described, which has trifoliate leaves, and *A. zeylanicus*, Linn.; Hook. Fl. Ind. i. 673; Gamble 22, a shrub or small tree of the Eastern Himalaya and Assam, with unifoliate leaves.

1. **A. Cobbe**, Bl.; Hook. Fl. Ind. i. 673; Kurz i. 299. *Ornitrophe Cobbe*, Willd.; Roxb. Fl. Ind. ii. 268. *Schmidelia Cobbe*, Beddome lxxiii. Vern. *Thaukhot*, Burm.

A deciduous shrub. Wood grey, soft. Pores small, scanty, medullary rays moderately broad, short, joined by numerous white parallel and equidistant concentric lines; prominent on a radial section.

Eastern Bengal, South India, Burma and Andaman Islands.

B 1988. Andaman Islands (Kurz 1866)	. . . . .	lbs.
		40

## 2. ÆSCULUS, Linn.

A genus containing two Indian species. The Horse-chestnut, commonly planted in Europe, is the *Æ. Hippocastanum*, Linn.

Wood white, soft to moderately hard. Annual rings distinct. Pores numerous, small or very small, generally abundant in the spring wood. Medullary rays uniform, equidistant, very fine, very numerous.

1. **Æ. indica**, Colebr.; Hook. Fl. Ind. i. 675; Brandis 103. The Indian Horse-chestnut. Vern. *Torjaga*, Trans-Indus; *Háne*, *hanádín*, Kashmir; *Bankhor*, *gugu*, *kanor*, *pánkar*, Hind.

A large deciduous tree. Bark grey, with long horizontal cracks, exfoliating in long flakes. Wood white, with a pinkish tinge, soft, close-grained. Annual rings marked by a line and sometimes by fewer

pores in the autumn wood Pores very small Medullary rays very fine, very numerous

H 31	Matiyana Smla 7 000 feet	lbs
H 166	Kangra Punjab (1866)	34
H 936	Hazara Punjab	35
H 776	Kalatop Punjab 7 000 feet	34

2 *Æ punduana* Wall, Hook Fl Ind 1 675, Gamble 22  
*Æ assamica*, Griff, Kurz 1 286 Vern *Cherinangri*, Nep, *Kunhir-kola*, *eluhia*, As, *Dingri*, *Duars*, *Bolnawal*, Garo

A moderate sized, deciduous tree Wood white soft, close grained  
Pores small, in short radial lines between the very fine closely packed,  
medullary rays Annual rings marked by a faint white line

Northern Bengal Khasia Hills Assam and Burma ascending to 4 000 feet  
Growth moderate 10 rings per inch of radius Weight 36 lbs per cubic foot  
Wood rarely used

E 3139	Buxa Reserve Western Duars	lbs
		36

### 3 SCHLEICHERA, Willd

1 *S trijuga*, Willd, Hook Fl Ind 1 681, Roxb Fl Ind 11  
277, Beddome t 119, Brandis 105, Kurz 1 289 Vern *Kosum*,  
*ginsam* Hind, *Rusam*, *Uriya*, *Pusku*, *may*, *roatanga*, Tel, *Pata*, *pū*,  
*pulachi*, *zolim buriki*, Tam, *Sagdi*, *sagade*, *chakota*, *akota*, Kan,  
*Chendala*, Coorg, *Puvatti*, *Kaders*, *Kassumar*, *loham*, *locham*, Panch  
Mehals, *Kusumb*, *peduman*, Mar, *Komur*, *pusku*, *Gondi*, *Baru*, *Kurku*,  
*Gyoben*, Burm, *Cong*, *conghas*, Cingh

A large deciduous tree Bark  $\frac{1}{2}$  inch thick, grey, exfoliating in  
small rounded plates of irregular shape and size Wood very hard  
Sapwood whitish, heartwood light, reddish brown Pores scanty,  
moderate-sized, often oval and subdivided White, wavy, concentric  
lines, which may possibly indicate the annual rings Medullary rays  
very fine, very numerous, wavy uniform and equidistant, closely packed,  
the distance between the rays less than the transverse diameter of the  
pores

Sub-Himalayan tract from the Sutlej eastwards Central and South India and  
Burma

The weight and transverse strength have been determined by the following  
experiments —

	found	Weight	Value of P
Brandis 1862 No 22 Burma		70 lbs	
1861 8 experiments with bars $3 \times 1\frac{1}{2} \times 1\frac{1}{2}$		68	1160
Baker 4 experiments 1879 $7 \times 2\frac{1}{2} \times 2\frac{1}{2}$		68	618
Wallch No 179 ( <i>Scytalia trijuga</i> )		60	
Smythies 1878 with our 8 specimens		67.5	—
A Mendis Ceylon Collection No 47		57	—

The wood is very strong and durable it is used for oil rice and

for agricultural implements and carts. The lac produced on this tree is highly prized. The fruit is often eaten, and the seeds give an oil used for burning in Malabar.

O	206.	Garhwal (1868)	.	.	.	.	.	.	.	lbs.
O	536.	Dehra Dûn	.	.	.	.	.	.	.	65
C	191.	Mandla, Central Provinces (1870)	.	.	.	.	.	.	.	65
C	1110.	Ahri Reserve, Central Provinces	.	.	.	.	.	.	.	66
C	2769.	Melghât, Berar	.	.	.	.	.	.	.	66
W	732.	South Kanara	.	.	.	.	.	.	.	62
B	319.	Burma (1867)	.	.	.	.	.	.	.	70
B	2515.	" (1862)	.	.	.	.	.	.	.	75
No.	47.	Ceylon Collection	.	.	.	.	.	.	.	72
			.	.	.	.	.	.	.	57

#### 4. SAPINDUS, Plum.

Four species according to the Flora Indica, but the nomenclature of Beddome and Brandis has been altered by Hiern; it will be convenient to use Brandis' names instead of those given in the Flora Indica. *S. Danura*, Voigt; Hook. Fl. Ind. i. 684; Kurz i. 298 (*Scytalia Danura*, Roxb. Fl. Ind. ii. 274). Vern. *Nancha*, *danûra*, Beng., is a small tree of Northern India, Northern and Eastern Bengal, Burma and the Andamans, chiefly in the tidal forests. The wood is said by Home (Sundarbans List, 1872-73) to be white, and to be used in Lower Bengal for boat and house building.

1. *S. emarginatus*, Vahl.; Beddome t. 154; Brandis 107; Roxb. Fl. Ind. ii. 279. *S. trifolius*, Linn.; Hook. Fl. Ind. i. 682. The Soapnut Tree. Vern. *Ritha*, Hind.; *Bara-ritha*, Beng.; *Mukta maya*, Uriya; *Konkûdû*, Tel.; *Pounanga*, *puvandi*, Tam.; *Thalay marathu*, *antawâla*, Kan.; *Areeta*, Mal.; *Puvella*, Cingh.

A large tree. Wood yellow, hard. Pores large, joined by concentric bands of soft tissue, which contain numerous extremely small pores; intervening are darker coloured bands of firmer tissue, in which the very fine, numerous medullary rays are prominent.

Bengal, South India and Ceylon, often cultivated.

Skinner, No. 114, gives the weight of the wood at 64 lbs., and P=682; it is sometimes used for building and carts, but the chief use of the tree is on account of its saponaceous berries, which are largely used as a substitute for soap. The root, bark and fruit are used in native medicine, and a semi-solid oil is extracted from the seed.

D 3209. Cuddapah, Madras.

B 2259 (51 lbs.) is a white, moderately hard wood sent by Major Ford from the Andamans in 1866; it perhaps belongs to this species.

2. *S. detergens*, Roxb. Fl. Ind. ii. 280; Brandis 107. *S. Mukorossi*, Gaertn.; Hook. Fl. Ind. i. 683. The Soapnut of North India. Vern. *Ritha*, *dodan*, *kanmar*, Hind.

A handsome deciduous tree with grey bark. Wood light yellow, rough, moderately hard, compact and close-grained; annual rings distinctly marked by a band of white tissue, containing large pores; the pores in the outer portion of each annual ring are very small and unite by narrow, concentric, often interrupted bands of white tissue. Medullary rays not straight, short, fine, numerous, lighter coloured than the intervening tissue. Pores and medullary rays distinctly visible on a vertical section.

Cultivated throughout North-West India and Bengal.

Growth slow, 13 to 15 rings per inch of radius. Weight, 44 lbs. Wood not used.

The fruit is very largely used and exported as a substitute for soap the leaves are given as fodder to cattle and the seeds used in medicine

H 117 Wazirpur Kulu 4000 feet  
H 3000 Kemu Sutlej Valley 2000

lbs  
41

3 *S. attenuatus*, Wall., Hook. Fl. Ind. 1 684, Gamble 23  
*Sapindus ruber*, Kurz 1 298 *Scytalia rubra*, Roxb. Fl. Ind. 11 272  
Vern. *Achatta*, Nep. *Sirhootu igchn*, Lepcha, *Lal loi pura*, Sylhet

A shrub or small tree with thin grey bark. Wood white, moderately hard. Annual rings marked by darker lines. Pores moderately large, scanty, often in short radial or wavy lines. Medullary rays short, white, very fine, numerous.

Eastern Himalaya Assam and Eastern Bengal down to Chittagong  
Flowers red. Fruit eaten in Sylhet

T 3272 Western Duars

## 5 NEPHELIUM, Linn

Four  
producers  
trees N  
N *lypol*  
Burma

Wood red, hard, prominent wavy concentric bands

1 *N. Longana*, Camb., Hook. Fl. Ind. 1 688, Kurz 1 294  
*Fuphoria Longana*, Lamk., Beddome 156 *Scytalia Longana*, Roxb. Fl. Ind. 11 270 The Longan Vern. *Ashphal*, Beng., *Poovali*, Tam., *Puna*, Courtallum, *Wurb*, Bombay, *Mal ahcola*, Kan., *Kyetmouk*, Burm. *Morre*, Cingh.

A moderate sized evergreen tree. Wood red, moderately hard. Pores small, numerous, uniformly distributed, the transverse diameter equal to the distance between the fine and very fine medullary rays. Prominent, wavy bands, broader than the rays, divide the wood into a succession of concentric strata which may possibly indicate the annual growth.

Mysore. Western Ghats and Burma. It is also found in China, where it is called *Longan*.

Weight 44 lbs. Wall. cl. No 179 62 lbs. A. Mendz. Our specimens gave 51 lbs. per cubic foot. The wood is not used though Kurz says it is good for furniture but it deserves notice. The fruit (the Longan) is eaten.

D 1218 Anamalai Hills Madras  
No 67 Ceylon Collection

lbs  
51  
62

2 *N. Litchi*, Camb., Hook. Fl. Ind. 1 687, Kurz 1 283 *Scytalia Litchi*, Roxb. Fl. Ind. 11 269 The Litchi Vern. *Litchi*, Hind. (originally Chinese), *Kyetmouk*, Burm.

A handsome evergreen tree with thin grey bark. Wood red, hard, heavy. Pores small to moderate sized, the transverse diameter usually greater than the distance between the rays. Medullary rays very fine, very numerous. Prominent wavy bands, as in *N. Longana*.

Introduced from South China, and now cultivated largely in India for its delicious fruit. Weight, about 50 lbs. per cubic foot.

O 3200 Saharanpur

## 6. POMETIA, Forst.

1. *P. tomentosa*, Bth. and Hook. f.; Hook. Fl. Ind. i. 691; Kurz i. 295. *Pometia eximia*, Beddome t. 157. Vern. *Thabyay*, Burm.; *Badoh*, And.

Under this name was collected by Kurz, in 1866, in the Andaman Islands, No. B 1973. It has a red heartwood, large, scanty, uniformly distributed pores, prominent on a vertical section; and closely packed, very fine medullary rays; the wood is traversed by prominent concentric lines, which may possibly be annual rings. Weight, 48 lbs. per cubic foot.

## 7. ACER, Tournef.

A large genus of European, Asiatic and American trees, which counts about 14 Indian species. The species not here described are *A. nivicum*, Bl.; Hook. Fl. Ind. i. 693; Kurz i. 289, a very large tree of Assam and Burma; *A. stachyophyllum*, Hiern; Hook. Fl. Ind. i. 694, a small tree of Independent Sikkim; *A. isolobum*, Kurz; Hook. Fl. Ind. i. 694; Kurz i. 289, an evergreen tree of the Martaban Hills from 5,000 to 7,000 feet elevation; and *A. pentapomicum*, J. L. Stewart; Hook. Fl. Ind. i. 694; Brandis 111. Vern. *Teekan*, *kakkri*, *kitta*, *tian*, *kilpattai*, *serán*, Pb., a tree of hot dry places in the inner ranges of the North-West Himalaya from Kashmir to Kumaun.

The species may thus be distinguished by characters taken almost exclusively from the leaves:—

Leaves undivided—

Basal nerves 3—

Leaves white beneath—

Cymes pubescent . . . . . *A. oblongum*.

„ glabrous . . . . . *A. nivicum*.

Leaves green beneath . . . . . *A. lævigatum*.

Basal nerves 5—

Leaves glabrous beneath—

Branches green, serratures of leaves none or very indistinct . . . . . *A. sikkimensc.*

Branches red, leaves finely duplicate-serrate . . . . . *A. Hookeri*.

Leaves pubescent beneath . . . . . *A. stachyophyllum*.

Leaves 3-lobed—

Lobes less than half the length of the leaves . . . . . *A. Thomsoni*.

Lobes deeper than half the length of the leaves—

Lobes lanceolate, acutely serrulate . . . . . *A. isolobum*.

Lobes ovate, obtusely serrate . . . . . *A. pentapomicum*.

Leaves 5-lobed and nerved—

Leaves pale beneath . . . . . *A. cæsium*.

Leaves green beneath—

Leaves large, serratures distant, simple . . . . . *A. villosum*.

Leaves small, serratures close, sharp . . . . . *A. caudatum*.

Leaves 5- to 7-lobed and usually 7-nerved—

Leaves serrulate . . . . . *A. Campbellii*.

Leaves entire . . . . . *A. pictum*.

The wood of *Acer* is generally shining and mottled by the medullary rays being prominent on a radial section. It is soft and close-grained. There is no heartwood, and the annual rings are generally well marked. The pores are small and very small, uniformly distributed; the medullary rays fine and very fine, often of two sizes. Concentric medullary patches are found in most species. The structure of the wood of the different species of Maple, European, Indian and American, is so similar that it is very difficult and perhaps impossible to distinguish the different species by the structure of their wood.

1. *A. oblongum*, Wall.; Hook. Fl. Ind. i. 693; Brandis 110; Gamble 22. Vern. *Mark*, Pb, *Pharengala*, *patangalia*, *kirmoli*, N.-W. P.; *Mugla*, *buzimpála*, Nep

A moderate-sized deciduous tree. Bark dark grey, smooth, with horizontal wrinkles. Wood light-reddish brown, moderately hard, close-grained. Annual rings faintly marked. Pores small, uniformly distributed. Medullary rays fine, red, distinctly visible on a radial section, giving the wood an elegantly mottled appearance.

Himalaya from the Jhelum eastwards to Bhutan, up to 6,000 feet

Growth moderate, 7 rings per inch of radius. Weight, 45 lbs per cubic foot

Wood used for agricultural implements and drinking cups

H 221	Garhwal (1868)	.	.	.	lbs
H 2944	Sutlej Valley, near Suni, 3,000 feet	.	.	.	45
					...

2. *A. lævigatum*, Wall., Hook. Fl. Ind. i. 693, Brandis 110; Kurz 1, 289; Gamble 22. Vern. *Saslendi*, *cherauni*, *thali kabashi*, Nep; *Tungnyok*, Lepcha.

A deciduous tree, with thick, smooth, grey bark. Wood white, shining, hard, close-grained. Pores small, scanty. Medullary rays short, not straight, fine and moderately broad, prominent.

Himalaya from the Jumna eastwards to Bhutan, between 5,000 and 9,000 feet, Khasia Hills, Tenasserim

Weight, 43 lbs per cubic foot. Used for planking and tea boxes

E 681.	Sepoydura, Darjeeling, 5,500 feet	.	.	.	lbs
					43

3. *A. sikkimense*, Miq., Hook. Fl. Ind. i. 694, Gamble 22. Vern. *Palegnyok*, Lepcha.

A small tree, with thin grey bark. Wood shining, grey, annual rings distinct. Pores small, very numerous. Medullary rays fine, numerous.

Hills of Sikkim and Bhutan, from 7,000 to 9,000 feet. Mishmi Hills

Growth slow, 10 to 15 rings per inch of radius

E 3102	Darjeeling, 7,000 feet	.	.	.	lbs
					37

4. *A. Hookeri*, Miq.; Hook. Fl. Ind. i. 694; Gamble 22. Vern. *Lal kabashi*, Nep; *Pale*, Lepcha.

A deciduous tree with brown bark,  $\frac{1}{2}$  inch thick, deeply cracked. Wood grey. Pores small. Medullary rays fine, red, very numerous.

Sikkim and Bhutan, above 7,000 feet.

Growth moderate, 8 rings per inch of radius. Weight, 37 lbs per cubic foot.

Plants with copper coloured foliage are not uncommon about Darjeeling

E 2339.	Rangbul, Darjeeling, 7,500 feet	.	.	.	lbs
					37

5. *A. Thomsoni*, Miq.; Gamble 22. *A. villosum*, Wall. var.; Hook. Fl. Ind. i. 695. Vern. *Kabashi*, Nep.

A large tree, bark thin, grey. Wood greyish white, soft. Pores small. Medullary rays fine and moderately broad, numerous.

Hills of Sikkim and Bhutan above 4,000 feet

Growth slow, 10 rings per inch of radius. Weight, 41 lbs per cubic foot

E 3103	Darjeeling, 5,000 feet	.	.	.	lbs
					41



## 6. POMETIA, Forst.

1. *P. tomentosa*, Bth. and Hook. f.; Hook. Fl. Ind. i. 691; Kurz i. 295. *Pometia crinia*, Beddome t. 157. Vern. *Thabyay*, Burm.; *Badoh*, And.

Under this name was collected by Kurz, in 1866, in the Andaman Islands, No. B 1973. It has a red heartwood, large, scanty, uniformly distributed pores, prominent on a vertical section; and closely packed, very fine medullary rays; the wood is traversed by prominent concentric lines, which may possibly be annual rings. Weight, 48 lbs. per cubic foot.

## 7. ACER, Tournef.

A large genus of European, Asiatic and American trees, which counts about 14 Indian species. The species not here described are *A. niveum*, Bl.; Hook. Fl. Ind., i. 693; Kurz i. 289, a very large tree of Assam and Burma; *A. stachyophyllum*, Hiern; Hook. Fl. Ind. i. 694, a small tree of Independent Sikkim; *A. isolobum*, Kurz; Hook. Fl. Ind. i. 694; Kurz i. 289, an evergreen tree of the Martaban Hills from 5,000 to 7,000 feet elevation; and *A. pentapomicum*, J. L. Stewart; Hook. Fl. Ind. i. 694; Brandis 111. Vern. *Teekan*, *kakkri*, *kitla*, *tian*, *kilpattai*, *serán*, Pb., a tree of hot dry places in the inner ranges of the North-West Himalaya from Kashmir to Kumaun.

The species may thus be distinguished by characters taken almost exclusively from the leaves:—

Leaves undivided—

Basal nerves 3—

Leaves white beneath—

Cymes pubescent . . . . . *A. oblongum*.

„ glabrous . . . . . *A. niveum*.

Leaves green beneath . . . . . *A. laevigatum*.

Basal nerves 5—

Leaves glabrous beneath—

Branches green, serrate . . . . .

indistinct . . . . .

Kangra (1866) . . . . .

8. *A. caudatum*, Wall.; Hook. Fl. Ind. i. 695; Brandis 112; Gamble 22. Vern. *Kanzla*, *kandaru*, *kanjara*, Simla; *Khansing*, *kabashi*, Nep.; *Yalishin*, Bhutia.

A moderate-sized deciduous tree, with dark-grey bark. Wood white, with a faint pink tinge, shiny, compact, moderately hard, sometimes with small masses of heartwood near the centre. Annual rings distinct. Pores small, uniform and uniformly distributed. Medullary rays moderately broad, short, giving on a radial section a beautifully mottled appearance.

Himalaya, from the Chenab to Bhutan between 7,000 to 11,000 feet.

Growth slow, 26 rings per inch of radius. Weight, 43 lbs. per cubic foot.

						lbs.
H	27.	Matiyána, Simla, 7,000 feet	.	.	.	45
H	41.	Mahasu, „ 8,000 „	.	.	.	44
H	74.	Kalashi, „ 6,000 „	.	.	.	41
H	3007.	Nagkanda, „ 9,000 „	.	.	.	...

9. *A. Campbellii*, Hook. f. and Th.; Hook. Fl. Ind. i. 696; Gamble 23. Vern. *Kabashi*, Nep.; *Daom*, *yatti*, Lepcha.

A large deciduous tree, with smooth grey bark. Wood greyish white, moderately hard, shining, close-grained. Annual rings marked by a thin line. Pores small, uniformly distributed. Medullary rays numerous, fine and moderately broad.

1. *A. oblongum*, Wall, Hook Fl Ind : 693, Brandis 110, Gamble 22 Vern Mark, Pb, Pharengala, patangalia, kirmoli, N-W P, Mugula, bu impala, Nep

A moderate sized deciduous tree Bark dark grey, smooth, with horizontal wrinkles Wood light reddish brown, moderately hard, close grained Annual rings faintly marked Pores small, uniformly distributed Medullary rays fine, red, distinctly visible on a radial section, giving the wood an elegantly mottled appearance

**Himalaya from the Jhelum eastwards to Bhutan up to 6 000 feet**

Weight 45 lbs per cubic foot

1b9  
45

H 221 Garhwal (1868)

H 2944 Sutlej Valley near Suni 3 000 feet

2 A lævigatum, Wall, Hook Fl Ind : 693, Brandis 110,  
 Kuiz : 289, Gamble 22 Vern *Saslendi, cherauni, thali Labashi*, Nep,  
*Tungnyok*, Lepcha

A deciduous tree, with thick, smooth, grey bark Wood white, shining, hard, close grained Pores small, scanty Medullary rays short, not straight, fine and moderately broad, prominent

Himalaya from the Jumna eastwards to Bhutan between 5 000 and 9 000 feet,  
Khasia Hills Tenasserim

**We ght, 43 lbs per cubic foot    Used for planking and tea boxes**

E 681 Sepoydura Darjeeling 5 500 feet

43

3 A sikkimense, Miq , Hook Fl Ind 1 694, Gamble 22 Vern  
*Palawan* ok, Lepcha

Brandis Fls, Kuntz 1 20, Gamble 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 10

An evergreen shrub, with thin grey bark exfoliating in long thin strips. Sapwood white, heartwood extremely hard and close grained, dark brown, with an irregular outline, annual rings (?) distinctly marked by fine white lines. Pores very small, in short radial lines. Medullary rays fine, white, very numerous.

[illegible]

- sed for engraving
- port the earth of
- like the Siwahh

Hill of Host 179pur

P 694 Salt Range Punjab

## 9 STAPHYLEA, LIEN

1, S Emodi, Wall, Hook, Fl Ind : 69S, Brandis 114 Vern  
chitra, chwat, lan-balkhu, lan-

grey with darker longitudinal,  
Pores very small between the

North-West Himalaya, above 6,000 feet.

Sticks are made of the wood which are sold in the hill bazars. They are supposed by the Afghans and frontier tribes to have the property of keeping off snakes. Weight, 44 lbs. per cubic foot.

H 2900.	Nagkanda, Simla, 8,000 feet	. . . . .	lbs. 41
H 3189.	Dungagalli, Hazara, 7,000 feet	. . . . .	47

## 10. TURPINIA, Vent.

Contains 2 Indian species, which in the Flora Indica are described as one. *T. pomifera*, DC., Kurz i. 292; Gamble 23. Vern. *Nagpat*, Nep.; *Singnok*, Lepcha; *Toukshama*, Burm., is a tree of the tropical forests of Bengal and Burma: while *T. nepalensis* comes from the hills.

1. *T. nepalensis*, Wall.; Beddome t. 159; Kurz i. 292; Gamble 23. *T. pomifera*, DC.; Hook. Fl. Ind. i. 698. Vern. *Thali*, Nep.; *Murgut*, Lepcha; *Nilā*, Nilgiris.

A moderate-sized deciduous tree. Bark  $\frac{1}{10}$  inch thick, grey, smooth. Wood grey, soft, even-grained. Pores small, very numerous, uniformly distributed. Medullary rays of two classes, the first being moderately broad, scanty, short, and the second fine, very numerous.

Himalaya from the Nepal Frontier eastwards, between 4,000 and 7,000 feet, Assam, Cachar, Chittagong and Burma.

Weight, 30 lbs per cubic foot. Wood not used, leaves given as fodder to cattle.

E 649.	Sepoydura Forest, Darjeeling, 5,500 feet	. . . . .	lbs. 30
E 3108.	Darjeeling, 6,000 feet	. . . . .	...

## ORDER XXXV. SABIACEÆ.

Contains 2 Indian genera, viz.: *Meliosma*, which is here described, and comprises trees or shrubs; and *Sabia*, a genus of about 10 climbing or sarmentose shrubs. Among these latter *S. campanulata*, Wall.; Hook. Fl. Ind. ii. i; Brandis 116. Vern. *Bakalpata*, Kumaun, of the Himalaya from Simla to Sikkim, above 5,000 ft. (H 3030, Nagkanda, 9,000 ft.; H 3193, Theog. 7,000 ft.); *S. paniculata*, Edgew.; Hook. Fl. Ind. ii. 3; Brandis 117; Gamble 23 of the Sub-Himalayan tract from the Jumna to Sikkim and *S. leptandra*, Hook. f. and Th.; Hook. Fl. Ind. ii. 2; Gamble 23. Vern. *Simali*, Nep.; *Payongrik*, Lepcha, of the Sikkim Hills, are the most noticeable. They have a soft wood, with large pores and broad medullary rays.

### 1. MELIOSMA, Blume.

A genus containing 7 species of Indian trees. Two are found in North-West India, four in the Eastern Himalaya, one in Burma and three in South India. Of those not here described, *M. pungens*, Wall.; Brandis 116. Vern. *Gardar*, *khara*s, Kumaun, is a tree of the North-West Himalaya from the Indus to Nepal, but rare west of the Sutlej; *M. Wightii*, Planch. (*M. pungens*, Bedd. lxxvii). Vern. *Tode*, Nilgiris, is a tree of the Western Ghāts often called Hill Mango by Europeans, but not used; *M. Arnottiana*, Wight; Beddome t. 160. Vern. *Huli makay*, Nilgiris; *Massivāra*, Mysore, is a large tree of the hills of South India, above 4,000 ft. elevation. Beddome says the heartwood of old trees is striped red and white, but that the timber is worthless. *M. pinnata*, Roxb. Fl. Ind. i. 104; Gamble 23. Vern. *Bolay*, Nep.; *Batiwa*, Sylhet, is a large tree of the outer Eastern Himalaya and Khasia Hills, whose wood is used for house-building.

Pores small, arranged in groups, or in short radial lines.

1. *M. dillenifolia*, Bl.; Hook. Fl. Ind. ii. 4, Brandis 115; Gamble 23. Vern. *Porda, parenga, philli*, Simla; *Gwep*, N.-W. P.

A small deciduous tree, with dark-grey bark. Wood white, soft, even-grained. Annual rings marked by a continuous line of pores. Pores small, in rounded groups of from ten to twenty, except along the annual rings. Medullary rays wavy, moderately broad and fine, distinctly marked on a radial section.

Throughout the Himalaya, from 4 000 to 11,000 feet, from the Sutlej to Bhutan  
Growth moderate, 4 to 6 rings per inch of radius, weight, 35 to 38 lbs per cubic foot

H 60	Nagkanda, Simla, 8,000 feet.	. . . . .	lbs
H 2892	" " "	. . . . .	38
			35

2. *M. simplicifolia*, Roxb. Fl. Ind. i. 103; Hook. Fl. Ind. ii. 5; Beddome lxxvii.; Brandis 116; Kurz i. 301; Gamble 23. *Millingtonia*, Roxb. Vern. *Kosrú*, Nep.; *Hingman*, Lepcha, *Koko*, Mechi; *Dibrú*, Ass; *Dantrung*, Sylhet, *Rong*, Chittagong; *Golpak*, Magh.

An evergreen tree. Wood reddish, moderately hard, warps. Pores small and moderate-sized, single or in short radial lines, numerous, uniformly distributed. Medullary rays moderately broad, very numerous.

Eastern Himalaya, Assam, Chittagong, Burma, South India and Ceylon  
Weight, 36 lbs per cubic foot

E 2339.	Sivoke, Darjeeling Terai	. . . . .	lbs
			36

3. *M. Wallichii*, Planch.; Hook. Fl. Ind. ii. 6, Gamble 24. Vern. *Dabidabbi, nunewalai*, Nep; *Himan*, Lepcha.

A large deciduous tree. Wood white, very soft, spongy. Pores large, in scattered groups of five to ten. Medullary rays broad and fine, distinctly marked on a radial section.

Eastern Himalaya and Khasia Hills, above 5,000 feet

Growth moderate, 8 to 10 rings per inch of radius Weight, 18 lbs per cubic foot

Wood used only for firewood and occasionally for boxes

E 361	Rangbúl, Darjeeling, 7,000 ft	. . . . .	lbs
			18

## ORDER XXXVI. ANACARDIACEÆ.

Tribe I.—Anacardiæ . . . . *Rhus, Pistacia, Mangifera, Anacardium, Bouca, Gluta, Buchanania, Melanorrhæa, Swintonia, Solenocarpus, Turpina, Odina, Parishia, Semecarpus, Drimycarpus, Holigarna* and *Nothopegia*.

" II—Spondiæ . . . . *Spondias* and *Dracontomelum*.

Tribe III.—*the rest Turpina* contains only *ern* Bengal down to Chittagong. *Vashul lara*, Nep., *Renchiling*, which are found in Tenasserim,

while of the third, *S. Schrenckii*, Teysm. and Binnend.; Hook. Fl. Ind. ii. 26; Kurz i. 316, herbarium specimens were sent from Chittagong accompanying E 1964. Vern. *Boilam, boilsur*, Beng.; *Sambúng, sanginphroo*, Magh; *Shibika*, Chakma; *Thayet san*, Burm., which has unfortunately been mislaid. It is a very large tree of the Eastern Peninsula from Chittagong southward and, especially in Chittagong, is remarkable by its tall straight, white stem and handsome foliage, which is tinged with red in the cold season. The wood is sometimes used for boats and is said by Major Lewin to last better than other woods in salt water. *Solenocarpus indica*, W. and A.; Beddome t. 233, is a tree of the Western Gháts. *Parishia insignis*, Hook. f. is a large handsome evergreen tree of Tenasserim and the Andaman Islands. *Nothopegia* contains three small trees of the Western Gháts; and *Dracontomelum mangiferum*, Bl. Vern. *Gunraduh*, And., is a large evergreen tree of the Andaman Islands.

According to the structure of the wood the genera of this family may be divided into two series. The first series which comprises *Melanorrhwa*, *Gluta*, *Borca* and *Mangifera* is characterized by closely packed medullary rays and somewhat scanty pores, of these the first three genera have hard and dark-coloured heartwood. The second series comprises *Rhus*, *Pistacia*, *Anacardium*, *Semecarpus*, *Odina*, *Buchanania*, *Spondias*, and *Drimycarpus*, and is marked by numerous fine, medullary rays, which are not closely packed, and numerous small or moderate-sized pores. The wood of the genera of this group is soft, and except that of *Pistacia*, *Rhus* and *Odina*, has no heartwood. The heartwood of *Pistacia* is hard and that of *Odina* moderately hard.

### 1. RHUS, Linn.

Contains 11 species, chiefly Himalayan. *Rhus parviflora*, Roxb. Fl. Ind. ii. 100; Brandis 119. Vern. *Tínga, rái túng, dungla, tímra, ranel*, Hind., is a shrub of dry slopes of the N.-W. Himalaya and of the hills of Central India, with a yellowish, close-grained wood. *R. khasiana*, Hook. f. and *R. Griffithii*, Hook. f. are small trees of the Khasia Hills and Chittagong, while *R. paniculata*, Wall., is found in Bhutan and in Burma. *R. Coriaria*, Linn., is the Sumach tree of Europe, whose leaves are used in tanning in the preparation of Morocco leather.

Wood grey, soft except in *R. mysorensis*, often streaked, with a yellow or brown heartwood. Pores small, often large and in continuous porous belts in the spring wood. Medullary rays fine and moderately broad.

1. *R. Cotinus*, Linn.; Hook. Fl. Ind. ii. 9; Brandis 118. Vern. *Paán, bhán, manu, banthra, túng, titri*, Pb.; *Tínga, tung, chaniát, ámi*, N.-W. P.

A shrub or small tree, deciduous. Bark thin, reddish brown, rough. Wood moderately hard; sapwood small, white; heartwood mottled, of a rich dark yellow colour. Annual rings marked by a belt of moderate-sized and large pores, the pores in the autumn wood very small, arranged in long, irregular, radial groups. Medullary rays fine, short.

Suliman Range, North-West Himalaya to Kumaun, ascending to 6,000 feet.

Growth slow, 32 rings per inch of radius. Weight, 56 lbs. per cubic foot. Used in South Europe for inlaid and cabinet work. In the Himalaya the twigs are used for basket-making, and the bark and leaves for tanning.

H	85.	Bhajji, Simla, 6,000 feet	.	.	.	.	.	.	lbs.
II	3182.	Dungagalli, Hazara	.	.	.	.	.	.	56
			.	.	.	.	.	.	...

2. *R. mysorensis*, Heyne; Hook. Fl. Ind. ii. 9; Beddome lxxviii.; Brandis 119. Vern. *Dasarni*, Ajmere.

A small shrub with thin brown bark Wood hard, pinkish yellow, close-grained, heavy Pores moderate sized, evenly distributed Medullary rays fine, very numerous, wavy, bent where they touch the pores

Sulman Range, Sind Punjab, Rajputana and the Dekkan Wood used only for fuel

P 3231 Nagpohar Forest Ajmere

P 3218 Ajmere

3 *R. semialata*, Murray, Hook Fl Ind n 10, Brandis 119, Gamble 24 *R. buckhamela*, Roxb Fl Ind n 99 *R. javanica*, Linn, Kurz 1 319 Vern *Titr*, *titr*, *chechar*, *arkhar*, *arkol*, *lakri*, *didla*, *kalkeran*, *wansh*, *kulashing*, Pb, *Rashtu*, Sutlej, *Dakhmila*, *daswila*, N W P, *Bakhmela*, *bhagmili*, Nep, *Takhri*, Lepcha

A moderate sized deciduous tree Bark  $\frac{1}{2}$  inch thick, rough, with deep vertical furrows Wood soft shining, grey with darker streaks Annual rings marked by a broad belt of closely packed large pores, the outer belt of each annual ring being often very narrow, with patches of very small pores Medullary rays fine

Outer Himalaya from the Indus to Assam ascending to 7 000 feet Khasia Hills Growth variable the Simla specimens had a slow growth of 16 rings per inch while the Darjeeling specimens had grown very fast 23 rings per inch of radius Weight 26 to 27 lbs per cubic foot Wood not used Fruit eaten by Nepalese and Lepchas who make a wax of it called *Omlu* Nep

H 89	Bhaji Simla, 5 000 feet	lbs
H 2912	Sunl Sutlej Valley 3 000 feet	26
H 3079	Annandale Simla, 6 000 feet	27
E 2310	Tukdah Darjeeling 5 000 feet	27

4 *R. punjabensis*, J L Stewart, Hook Fl Ind n 10, Brandis 120 Vern *Titr*, *arkhar*, *palai*, *choklu*, *langar*, *kalkrein*, *dor*, *rashtu*, Punjab

A moderate sized deciduous tree, with rough dark grey bark and scented aromatic leaves Wood consisting of alternate layers of soft, porous spring wood and hard autumn wood Heartwood yellowish grey, with dark longitudinal streaks, moderately hard Annual rings marked by a broad belt of closely packed large pores, the pores in the rest of the annual rings scattered, small or very small, in groups or patches of soft tissue

North West Himalaya ascending to 8 500 feet

Growth slow 11 rings per inch of radius Weight 31 lbs per cubic foot

H 19	Matyana, Simla 8 000 feet	lbs
H 3051	Kotgarh Simla 7 000 feet	33
H 3170	Dunagalli Hazara	35
		—

5 *R. insignis*, Hook f, Hook Fl Ind n 11, Gamble 21 Vern *Agphulai*, Nep, *Serk*, Lepcha

A moderate sized tree, with thin grey bark Wood grey, soft heartwood yellowish brown Pores small and moderate sized, uniformly distributed Medullary rays fine, numerous

Sikkim and the Khasia Hills above 4 000 feet.

Growth fast 3 to 4 rings per inch of radius

F 3101	} Darjeeling 7 000 feet	lbs
1 3102		{ - }
		{ - }

6. *R. Wallichii*, Hook. f.; Hook. Fl. Ind. ii. 11. *R. vernicifera*, DC.; Brandis 120. Vern. *Kambal*, *gadúmbal*, *rikhali*, *arkhar*, *arkol*, *lohása*, *harkú*, Punjab; *Akoria*, *kaunki*, *bhuliún*, N.-W. P.; *Bhálalo*, *chosi*, Nep.

A small or moderate-sized tree, exuding, from between the bark and the wood, a black acrid varnish, which draws blisters. Sapwood white, soft; heartwood reddish brown, yellow when dry (*Brandis*). Structure similar to that of *R. semialata*.

N.-W. Himalaya, from 2,000 to 7,000 feet.

The wood is used in the Sutlej Valley for saw frames and axe handles. The juice of the leaves is corrosive and blisters the skin.

H 3078. Annandale, Simla, 6,600 feet.

7. *R. succedanea*, Linn.; Hook. Fl. Ind. ii. 12; Roxb. Fl. Ind. ii. 98; Brandis 131. *R. acuminata*, DC.; Gamble 24. Vern. *Tatri*, *arkol*, *titar*, *lakhur*, *rikhúl*, *shash*, *hurku*, Pb.; *Raniwalai*, Nep.; *Serhnyok*, Lepcha; *Dingkain*, Khasia.

A small deciduous tree, with thin bark. Wood white, shining, soft, with a small darker-coloured heartwood. Structure similar to that of *R. semialata*.

Himalaya, from the Jhelum to Assam, Khasia Hills, from 2,000 to 8,000 feet.

The wood is not used. The juice is acrid and causes blisters, the seeds give a good wax, and the tree is planted in Japan along roads and regularly worked for this wax, which is of a snow-white colour and is made into candles.

H 2907.	Nagkanda, Simla, 7,000 feet	.	.	.	.	.	.	lbs.
H 3167.	Dungagalli, Hazára	.	.	.	.	.	.	32
								...

## 2. PISTACIA, Linn.

Contains only one Indian species. The pistachio nuts (*pista*), which are imported into India from Afghanistan, are the produce of *Pistacia vera*, Linn., a small tree of Western Asia, cultivated in South Europe. *P. Lentiscus*, Linn., a shrub of the Mediterranean region, is the true Mastic of Chios. *P. Terebinthus*, Linn., the Terebinth Tree, gives the Chio or Cyprus turpentine, and the galls found on it are used in tanning.

1. *P. integerrima*, J. L. Stewart; Hook. Fl. Ind. ii. 13; Brandis 122. Vern. *Kaka*, *kakkar*, *kakrangeche*, *kakring*, *kangar*, *tungu*, Pb.; *Kakar singi*, Kumaon; *Shué*, *sarawan*, *masua*, Afg.

A deciduous tree, with rough grey bark. Sapwood white; heartwood yellowish brown, beautifully mottled with yellow and dark veins, very hard. Annual rings marked by a belt of closely packed pores. Pores of two classes: those in the spring wood moderate-sized, while those in the greater portion of the wood are very small, forming interrupted, wavy lines, and grouped in irregular, narrow patches, which are frequently arranged in zigzag lines. Medullary rays fine, very numerous.

Suliman and Salt Ranges, outer North-West Himalaya, ascending to 6,500 feet and extending east as far as Kumaon.

Growth moderate, 8 to 9 rings per inch of radius. Weight, 54 lbs. per cubic foot. The wood is used for furniture, carvings and all kinds of ornamental work. It is usually sold in the hill bazars and particularly at Simla, in the form of thick short planks. The leaves are lopped for fodder for buffaloes and camels, and the galls are used in native medicine.

H	6	Juling Simla 4 000 feet	lbs
H	11	Kombarsen Simla 6 000 feet	50
H	160	Hazara Punjab (1866)	52
H	926	Hazara, Punjab	46
H	898	Murree Punjab 7 000 feet	56
H	227	Garhwal (1868)	60
H	2930	Simla 6 000 feet	63

### 3 MANGIFERA, Linn

Besides the 3 species here described *M longipes* Griff Kurz 1 303 Vern *Thayet thee nee* Burm is an evergreen tree of the swamp forests of Burma, and *M fatida* Lour Vern *Lamote*, Burm a large tree cultivated in Southern Texas serum for its fruit

No heartwood Wood soft, somewhat spongy Pores large, prominent on a vertical section Medullary rays fine, generally closely packed Numerous, fine, wavy, concentric lines

1 *M indica*, Linn, Hool Fl Ind n 13, Roxb Fl Ind 1 641, Beddome t 162, Blandis 125, Kurz 1 304, Gamble 24 The Mango Tree Vern *Am*, Hind, *Gharām*, Ass, *Jegachu*, Gajo, *Marla*, Gondi, *Ambe*, Kulu, *Amba*, Mar, *Maa*, *mangas*, Lam, *Mamadi*, *mamid*, Tel, *Marena*, *mavu*, Kan, *Maca*, Mal, *Thayet*, Burm

A large evergreen tree Bark thick, dark grey, nearly black, rough with numerous small fissures and exfoliating scales Wood grey, coarse-grained, soft Pores scanty, moderate sized and large, distinctly marked on a longitudinal section Medullary rays fine, wavy, closely packed

Wild on the Western Glāts cultivated all over India

41 42 (Skinner, No 90),  
 $\times 1''$  gave  $P = 587$ ,  
 Cunn glims two experiments  
 and Biker's with bars  $6 \times 2 \times 2'$   
 in low frames in Calcutta for  
 and Masula boats are made of it

F	637	Gorpara Assam	lbs
B	2302	Assam	43
F	3131	Calcutta	33
E	1957	Chittagong	41
D	2003	Mysor	39

2 *M. caloneura*, Kurz 1 305, Hool Fl Ind n 14 Vern *Thayet*, Burm

An evergreen tree Wood light brown, moderately hard Pores large, scanty, prominent on a vertical section Medullary rays fine, very numerous Fine, wavy, concentric lines

Burma

Weight 30 lbs per cubic foot

B	204	Burma (1867)	lbs
B	2039	(1867)	38



6. *R. Wallichii*, Hook. f.; Hook. Fl. Ind. ii. 11. *R. vernicifera*, DC.; Brandis 120. Vern. *Kambal*, *gailumbal*, *rikhali*, *arkhar*, *arkol*, *lohása*, *harkú*, Punjab; *Akoria*, *kaunki*, *bhulín*, N.-W. P.; *Bhálaio*, *chosi*, Nep.

A small or moderate-sized tree, exuding, from between the bark and the wood, a black acrid varnish, which draws blisters. Sapwood white, soft; heartwood reddish brown, yellow when dry (*Brandis*). Structure similar to that of *R. semialata*.

N.-W. Himalaya, from 2,000 to 7,000 feet.

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H 3078. Annandale, Simla, 6,600 feet.

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A small deciduous tree, with thin bark. Wood white, shining, soft, with a small darker-coloured heartwood. Structure similar to that of *R. semialata*.

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A deciduous tree, with rough grey bark. Sapwood white; heartwood yellowish brown, beautifully mottled with yellow and dark veins, very hard. Annual rings marked by a belt of closely packed pores. Pores of two classes: those in the spring wood moderate-sized, while those in the greater portion of the wood are very small, forming interrupted, wavy lines, and grouped in irregular, narrow patches, which are frequently arranged in zigzag lines. Medullary rays fine, very numerous.

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Growth moderate, 8 to 9 rings per inch of radius. Weight, 54 lbs. per cubic foot. The wood is used for furniture, carvings and all kinds of ornamental work. It is usually sold in the hill bazars and particularly at Simla, in the form of thick short planks. The leaves are lopped for fodder for buffaloes and camels, and the galls are used in native medicine.

		lbs
H 6	Julung Simla 4 000 feet	
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A large evergreen tree Bark thick, dark grey, nearly black, rough with numerous small fissures and exfoliating scales Wood grey, coarse-grained, soft Pores scanty, moderate sized and large, distinctly marked on a longitudinal section Medullary rays fine, wavy, closely packed

44 12 (Skinner, No 90),  
 $\times 17$  gave  $P = 587$ ,

Cunningham's two experiments and Bakers with bars  $6 \times 2 \times 2$  in low frames in Calcutta for and Masula boats are made of it

but germinate well if sown when quite fresh

		lbs
F 637	Goalpara Assam	48
B 2302	Assam	33
F 3171	Calcutta	41
E 157	Chittagong	39
D 2003	Mysore	39

2 *M. caloneura*, Kurz : 305, Hook Fl Ind n 14 Vern *Tuk-thayet*, Burm

An evergreen tree Wood light brown, moderately hard Pores large, scanty, prominent on a vertical section Medullary rays fine, very numerous Fine, wavy, concentric lines

Burma

Weight 30 lbs per cubic foot

		lbs
B 204	Burma (1867)	
B 2012	(1862)	

3. *M. sylvatica*, Roxb. Fl. Ind. i. 644; Hook. Fl. Ind. ii. 15; Kurz i. 304; Gamble 24. Vern. *Bun am*, Ass.; *Lakshmi am*, Sylhet; *Chuchi am*, Nep.; *Katúr*, Lepcha; *Hseng neng thayet*, Burm.

A large evergreen tree with a thick grey bark. Wood grey, moderately hard. Structure the same as that of *M. caloneura*, but the medullary rays are less distinct and less numerous. Numerous wavy, concentric lines.

Nepal, Eastern Bengal and the Andamans; rare in Burma.

Weight, 34 to 41 lbs. Wood not used, but worth trial for tea boxes. The fruit is sometimes eaten fresh or dried. It is also used medicinally. (*Roxb.*)

E 594.	Kookloong Forest, Darjeeling Terai . . . . .	lbs.
E 952.	Golaghát, Assam . . . . .	41
		34

#### 4. ANACARDIUM, Rottb.

1. *A. occidentale*, Linn.; Hook. Fl. Ind. ii. 20; Roxb. Fl. Ind. ii. 312; Beddome t. 163; Kurz i. 310. The Cashew Nut Tree. Vern. *Kajú*, Hind.; *Hijuli*, Beng.; *Kola mava*, *mundiri*, Tam.; *Jidi mamidi*, Tel.; *Jidi*, *Kempu géru*, Kan.; *Thee-hoh thayet*, Burm.

A small evergreen tree, with rough bark. Wood red, moderately hard, close-grained. Pores large, prominent on a vertical section. Medullary rays indistinct.

Originally from South America, now established in the coast forests of Chittagong, Tenasserim, the Andaman Islands and South India.

Growth moderate, 8 to 11 rings per inch of radius. Weight, 38 to 39 lbs. per cubic foot. The wood is used for packing cases in Burma, for boat-building and charcoal. The nuts are roasted and eaten as dessert, they also give, by expression, a yellow oil similar to almond oil. The pericarp of the fruit gives a black acrid oil which is called 'cardol' and gives an acid called 'anacardic acid.' The oil is very caustic, raises blisters and is used for warts, corns, and ulcers; it is also used to prevent the attacks of white ants to wood-work and of insects to the binding of books, and in the Andamans to colour and preserve fishing lines; the enlarged pedicels of the fruit are eaten.

B 2227	. . . . .	lbs.
B 2229.	Andamans (1866) . . . . .	38
		39

#### 5. BOUEA, Meissner.

1. *B. burmanica*, Griff.; Hook. Fl. Ind. ii. 21. *B. oppositifolia*, Meissn.; Kurz i. 306. *Mangifera oppositifolia*, Roxb. Fl. Ind. i. 640. Vern. *Meriam*, *mayan*, Burm.

A moderate-sized evergreen tree with dark-grey bark. Wood grey, hard, with a dark reddish brown heartwood. Pores scanty, moderate-sized, prominent on a vertical section. Medullary rays fine, numerous, undulating. Wavy concentric lines dividing the wood into a succession of concentric bands, which may possibly be annual rings.

Burma and Andaman Islands.

Weight, 55 lbs. per cubic foot. The wood is not specially used, but is said by Roxburgh to be very durable. The tree has an edible fruit, for which it is often cultivated.

B 2213.	Andamans (1866) . . . . .	lbs.
		55

# 6 GLUTA, Linn

Contains 3 species one (that here described) from South India and two from Burma viz *G taroyana*, Wall , Hook Fl Ind ii 22, Kurz i 309 Vern *Thayet thitsay* Burm, and *G elegans*, Wall , Kurz i 309 small trees of the Tenasserim coast Kurz says that the wood when steeped in ferruginous mud turns jet black, looking like ebony, and that it is used for building, for boxes and for dyeing

## 1. *G travancorica*, Beddome t 60, Hook Fl Ind. ii 22 Vern *Shencurungi*, Tinnevely

A very large evergreen tree, bark  $\frac{1}{2}$  inch thick, grey. Sapwood light-reddish grey, heartwood dark red, very hard and close-grained, beautifully mottled with dark and light streaks Pores moderate-sized, scanty, filled with resin Medullary rays very fine, very numerous, prominent, visible on a radial section as narrow bands Numerous white, undulating, concentric lines and bands, of lighter colour in the wood

1 of radius Weight, according to Beddome, is 46 and 58 lbs The wood is little used but it rapidly brings it to notice as a valuable wood

for furniture It seems to season very well, and works and polishes admirably

D 1066	Tinnevely (some sapwood)	lbs
D 3155	„ (heartwood only)	46
		58

# 7. BUCHANANIA, Roxb

A genus of 7 Indian species most of which are trees from Tenasserim and the Andaman Islands *B angustifolia*, Roxb Fl Ind ii 386, Hook Fl Ind ii 23, Beddome lxxix Vern *Sara, chara, pedda morali*, Tel, is a small tree of South India

## 1. *B. latifolia*, Roxb Fl Ind ii 385, Hook Fl Ind ii 23, Beddome t 165, Brandis 127, Kurz i 307 Vern *Chirauli*, Pb, *Pial, payála, muriá, katbhalawa*, Garhwál, *Piar, peirah*, Oudh, *Achár, char, chironyi*, C P, *Saraka, herka*, Gondí, *Taro*, Kurku, *Charu*, Uriya; *Kat maá, aima*, Tam, *Chala, chinna morali, morli*, Tel, *Charwarí*, Hyderabad, *Nuskul, murlalu*, Kan, *Sir, Bhil, Pyal, charoli*, Bombay, *Lamboben, lonepho*, Burm

A tree, leafless only for a very short time Bark  $\frac{1}{2}$  inch thick, dark grey, sometimes black, rough, tessellated with deep irregular cracks Wood greyish brown, moderately hard, with a small dark-coloured heartwood Pores large, round or oval, frequently subdivided, uniform and equidistant, prominent on a longitudinal section Medullary rays very numerous, fine, reddish, uniform and equidistant, bent outwards where they touch the pores, marked on a radial section as long, narrow, dark-coloured plates, the distance between the rays being less than the transverse diameter of the pores

Sub-Himalayan tract from the Sutlej eastwards, ascending to 3000 feet Through out India and Burma

Weight 30 lbs of radius gives 33 lbs lbs of heartwood is used for fuel resembles pistachio nuts, they are largely used in native oil is extracted from them

114.  
35  
29  
36  
32

# *MYLANORRHIZA*, Wall.

*M. villosa*, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 318. The tree of Terasseria.

1. *M. villosa*, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 318. The tree of Terasseria. Vern. Ass., Manipur; *Thitseeben*, Burm.; &c.

A deciduous tree, 10-15 feet high. Wood dark red with yellowish streaks, becoming grey after long exposure; very hard. Pores moderate-sized, crowded, not subdivided. Each pore or group of pores enclosed in a small, light tissue. Medullary rays very fine, wavy, numerous. Annual rings white, undulating, concentric lines of softer tissue, unequally distributed in the wood.

Manipur and Burma.

The following experiments have been made to determine the weight and transverse strength:

	Weight.	Value of P.
Benson, in Burma, with bars 3 x 3 x 14.	found 61 lbs.	526
Skinner, in 1862, No. 91.	61 "	514
Brandis' Burma List, 1862, No. 44.	51 "	...
Smythies found the average of our two specimens.	59 "	...

The wood is used for tool handles, and for building, railway sleepers, gunstocks, and has lately been recommended for other purposes. It gives a black varnish, used to cover buckets to make them light. The varnish is used by the Burmese in lacquer work, as size in galls, and for leaf books, and for many other uses. It has been used for the same purpose with great success.

B 57	Wlmein.	Re.
B 27.	(1862)	56
		62

1. O. Roxb.  
Beddome Bran  
Kiamil, mlai,  
gingyan, H. ja, Bi  
Jiyal, loha) ig.; G  
gumpna, du ri, du  
Kekeda, K ti, pu  
Hneingl'oi abha  
A mode orge  
inch thick, v, s  
Sapwood lar od H  
brown on exp tel  
not warp, not F  
often subdivi  
touch the pore

Sub-Himalay  
of India and Bur

The following experiments have been made to determine the weight and transverse strength —

	Weight found	Value of P
Skinner No 101, 1862	50	821
Benson, Burma wood bars $3 \times 1 \frac{1}{4} \times 1 \frac{1}{4}$	60	281
Brandis, No 46 Burma List 1862	65	"
Smythies 1878 our specimens (omitting the very old pieces and sapwood)	50 5	"

The wood is used for spear shafts scabbards wheel spokes cattle yokes oil presses and rice pounders it might be good for cabinet work It has been tried for sleepers both in Madras and in the Oudh and Rohilkhand Line but has not succeeded The tree is pollarded for fodder, especially for elephants, its bark is used for tanning it  
vers in  
mpbell,  
ig with  
to the

H 3019	Kumharsen, Satalj Valley, 2 500 feet (sapwood)	157
P 447	Ajmere	35
P 3225	Nagpal ar Ajmere	43
O 226	Garhwal (1868)	38
O 2992	(1874)	41
C 202	Mandla, C P (1870)	38
O 1103	Ahri Reserve C P	49
E 661	Bamunpokri Darjeeling Terai	46
E 2342	"	48
E 1399	Chittagong	44
E 1965	"	61
B 1414	Tharrawaddy Burma	64
B 2517	Burma (1862)	35
B 516	Andaman Islands	60

## 10 SEMECARPUS, Linn fil

Contains about 6 Indian species mostly Burmese. Amongst them besides the species described the most important are *S travancorica* Beddome t. 232, Hook II Ind n 81 Vern *Natu sengote* Lam, and *S auriculata*, Badd., large handsome trees of the Tinnevely and Travancore hills

1. *S Anacardium*, Linn f, Hook II Ind n 30, Roxb II Ind n 83, Beddome t 166, Brandis 124, Kurz 1 312, Gamble 25 The Marking nut Tree Vern *Bhalauca*, *bheyla*, Hind, *Bhalai*, Nep, *Bhela*, *bhelatuki*, Beng, *Bhallia*, Uriya, *Kongki*, Lepcha, *Bawara*, Garo, *lohka*, *biba*, Gondi, *Shaing*, *Shayrang*, Tam, *Jiri*, *jidi*, *nella-jedi*, Tel, *Ghern*, *Kari gheru*, Kan, *Bibwa*, *bibu*, Mar, *Chyas beng*, Burm

A deciduous tree, bark  $\frac{1}{2}$  inch thick, dark brown, rough, exfoliating in very irregular inner patches, inner bark fibrous Wood greyish brown, often with yellow streaks, soft, no annual rings Pores scanty, moderate-sized, frequently subdivided, well marked on a vertical section Medullary rays numerous, moderately broad, reddish, prominent on a radial section as long, narrow, dark-coloured plates

Sub-Himalayan tract from the Satalj eastwards ascending to 3 500 feet, forests of

acid juice which causes swelling and irritation, and timber-cutters object to felling

O 245.	Garhwal (1868)	.	.	.	.	.	.	.	lbs.
C 1124.	Ahíri Reserve, Central Provinces	.	.	.	.	.	.	.	35
C 2751.	Moharli	.	.	.	.	.	.	.	29
C 2763.	Melghát, Berar	.	.	.	.	.	.	.	36
C 1249.	Gumsúr, Madras	.	.	.	.	.	.	.	...
		.	.	.	.	.	.	.	32

## 8. MELANORRHŒA, Wall.

Contains 2 species: that here described and *M. glabra*, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 317. Vern. *Thitseeben*, Burm., a tree of Tenasserim.

1. *M. usitata*, Wall.; Hook. Fl. Ind. ii. 25; Kurz i. 318. The Varnish Tree of Burma. Vern. *Kheu*, Manipur; *Thitseeben*, Burm.; *Soothan*, Taleing; *Kiahong*, Karen.

A deciduous tree, with dark-grey bark. Wood dark red with yellowish streaks, turning very dark after long exposure; very hard. Pores moderate-sized, not numerous, often subdivided. Each pore or group of pores enclosed in a small patch of light tissue. Medullary rays very fine, wavy, numerous. Numerous white, undulating, concentric lines of softer tissue, unequally distributed in the wood.

Munipur and Burma.

The following experiments have been made to determine the weight and transverse strength:

	Weight.	Value of P.
Benson, in Burma, with bars 3' × 1.4" × 1.4".	found 61 lbs.	526
Skinner, in 1862, No. 91,	" 61 "	514
Brandis' Burma List, 1862, No. 44	" 54 "	...
Smythies found the average of our two specimens	59 "	...

The wood is used for tool handles, anchor stocks, and has lately been recommended for building, railway sleepers, gun-stocks and other purposes. It gives a black varnish, used to cover buckets to make them watertight. This varnish is used by the Burmese in lacquer work, as size in gilding, for writing in palm-leaf books, and for many other purposes. It has been used in medicine as an anthelmintic with great success.

B 551.	Moulmein, Burma	.	.	.	.	.	.	lbs.
B 2518.	Burma (1862)	.	.	.	.	.	.	56
		.	.	.	.	.	.	62

## 9. ODINA, Roxb.

1. *O. Wodier*, Roxb. Fl. Ind. ii. 293; Hook. Fl. Ind. ii. 29; Beddome t. 123; Brandis 123; Kurz i. 321; Gamble 24. Vern. *Kiamil*, *kimúl*, *kamlái*, *kashmala*, *jhingan*, *mowen*, *mohin*, *moyen*, *ginyan*, Hind.; *Garja*, Bijeragogarh; *Bara dabdabbi*, *halloray*, Nep.; *Jiyal*, *lohar bhadi*, Beng.; *Gob*, Ajmere; *Wodier*, *wude*, Tam.; *Gumpini*, *gumpna*, *dumpini*, *dumpri*, *dumper*, Tel.; *Kaikra*, *gumpri*, *gharri*, Gond; *Kekeda*, Kurku; *Shimti*, *púníl*, *gojal*, Kan.; *Moi*, *moja*, *moye*, Mar.; *Hneingpyoing*, Magh; *Nabhay*, Burm.

A moderate-sized or large deciduous tree with few branches. Bark  $\frac{1}{2}$  inch thick, compact, grey, smooth, exfoliating in small irregular plates. Sapwood large; heartwood light red when fresh cut, turning reddish brown on exposure, moderately hard, close-grained, seasons well and does not warp, not very durable. Pores moderate-sized, uniformly distributed, often subdivided. Medullary rays fine, numerous, short, bent where they touch the pores.

Sub-Himalayan tract from the Indus eastwards, ascending to 4,000 feet. Forests of India and Burma.

The following experiments have been made to determine the weight and transverse strength —

	Weight found	Value of P
Skinner No 101 1862	50	821
Benson Burma wood bars $3 \times 1\frac{1}{4} \times 1\frac{1}{4}$	60	281
Brandis No 46 Burma Lat 1862	60	
Smythies 1878 our specimens (omitting the very old pieces and sapwood)	50	..

The wood is used for spear shafts scabbards wheel spokes cattle yokes oil presses and rice pounders it might be good for cabinet work It has been tried for sleepers both in Madras and in the Oudh and Rohilkhand Line but has not succeeded The tree is pollarded for fodder especially for elephants its bark is used for tanning it

		lbs
H 3019	Kumbarsen Sutlej Valley 2500 feet (sapwood)	35
P 417	Ajmere	43
P 320	Nagpohar Ajmere	~
O 26	Garhwal (1868)	38
O 2992	(1871)	41
C 202	Mandla C P (1870)	38
C 1103	Ahuri Reserve C P	48
E 661	Bamunpokri Darjeeling Terai	46
E 2342		48
E 1399	Clittagong	41
E 1900		61
B 1414	Tharrawaddy Burma	64
B 2517	Burma (1864)	35
B 516	Andaman Islands	60

## 10 SEMECARPUS, Linn fil

Contains about 6 Indian species mostly Burmese Amongst them besides the species described the most important are *S travancorica* Beddome t 232 Hook Fl Ind n 31 Vern *Nalishengote* Gam and *S auriculata* Bdd large handsome trees of the Tinnevely and Travancore hills

1 *S Anacardium*, Linn f, Hook Fl Ind n 30, Roxb Fl Ind n 83, Beddome t 166, Brandis 121 Kurz 1 312, Gamble 25 The Marling nut tree Vern *Bhalawa, bheyla*, Hind, *Bhalai*, Nep, *Bhela, bhelatuli*, Bang, *Bhallia*, Uriya, *Kongki*, Lepcha, *Bawara*, Garo, *lohla, biba*, Gonthi, *S'aisig, Shayrang*, Tam, *Jiri, jidi, nella jeli*, Tel, *Gheru, kari gheru* Kan, *Bibwa, bibu*, War, *Chyas beng*, Burm

A deciduous tree, bark  $\frac{1}{2}$  inch thick, dark brown, rough, exfoliating in very irregular inner patches, inner bark fibrous Wood greyish brown, often with yellow streaks soft, no annual rings Pores scanty, moderate sized, frequently subdivided, well marked on a vertical section Medullary rays numerous, moderately broad, reddish, prominent on a radial section as long, narrow, dark coloured plates



it; it is not used. The ripe fruit is much used; the fleshy cup is eaten, but is best either dry or roasted. The pericarp contains an acrid juice which is universally used in India for marking ink and in medicine. The ink is improved by the addition of lime water. The green fruit is pounded and made into bird-lime.

C 1157.	Ahiri Reserve, Central Provinces.	.	.	.	.	.	lbs.
C 2746.	Moharli "	.	.	.	.	.	44
E 578.	Kookloong Forest, Darjeeling Terai	.	.	.	.	.	40
E 627.	Bamunpokri "	.	.	.	.	.	39
E 2311.	" " "	.	.	.	.	.	30
		.	.	.	.	.	33

The Ahiri specimen, C 1157, has pores joined by irregularly-shaped soft tissue across the medullary rays, and has a harder and closer-grained wood than the Darjeeling specimens; the bark is, however, that of *S. Anacardium*, and there is no reason to doubt its identity. The specimens from Darjeeling are marked by the absence of the lines of softer tissue joining the pores, and it may be suggested for investigation whether they do not come from a different species of *Semecarpus*.

## 11. DRIMYCARPUS, Hook. f.

1. *D. racemosus*, Hook. f.; Hook. Fl. Ind. ii. 36; Kurz i. 314; Gamble 26. *Holigarna racemosa*, Roxb. Fl. Ind. ii. 82. Vern. *Kagi*, Nep.; *Brong*, Lepcha; *Telsur*, Beng.; *Amdali*, Ass.; *Chengane*, *sangaipru*, *sangryn*, Magh; *Amjour*, Sylhet.

A large evergreen tree. Wood greyish yellow, hard, close-grained. Pores large and moderate-sized, sometimes subdivided, each pore in a narrow white ring. Medullary rays short, moderately broad, uniform and equidistant, joined by innumerable faint, transverse lines.

Eastern Himalaya from 2,000 to 6,000 feet, Khasia hills and Sylhet to Chittagong, Pegu.

Weight, 61 lbs. per cubic foot. Wood used occasionally in Assam for canoes and planking; in Chittagong for boats, for which it is one of the woods most employed. Major Lewin says that boats 50 feet long and 9 feet in girth are sometimes cut.

E 722.	Chittagong	.	.	.	.	.	.	lbs.
		.	.	.	.	.	.	61

## 12. HOLIGARNA, Ham.

Seven species. *H. Arnottiana*, Hook. f.; Hook. Fl. Ind. ii. 36. (*H. longifolia*, Wt. and Arn.; Beddome t. 167). Vern. *Kagira*, *kutugeri*, Kan.; *Hülgeri*, Bombay, is a large tree of the Western Ghâts, where also are found *H. ferruginea*, Marchand. *H. Grahamii*, Hook. f. (*Semecarpus Grahami*, Wight; Beddome lxxix.) and *H. Beddomei*, Hook. f.; *H. Helfer*, Hook. f.; Kurz i. 315 and *H. albicans*, Hook. f., are trees of Burma.

1. *H. longifolia*, Roxb. Fl. Ind. ii. 80; Hook. Fl. Ind. ii. 37. Vern. *Barola*, Beng.; *Khreik*, Magh.

Wood grey with yellowish streaks, soft. Pores moderately large, sometimes subdivided, uniform, scanty, prominent as dark lines on a vertical section. Medullary rays fine, white, short, equidistant.

Chittagong and Burma.

Wood not used. It, like all the other species, gives a black acrid exudation which raises blisters and is much dreaded by the hill people.

E 3287. Rinkheong Forest, Chittagong.

## 13. SPONDIAS, Linn.

Contains 3 species, including, besides the one described, *S. acuminata*, Roxb. Fl. Ind. ii. 453, of South India; and *S. axillaris*, Roxb. Fl. Ind. ii. 453, of Nepal.

1 *S mangifera*, Pers , Hool Fl Ind n 42, Roxb Fl Ind n 451, Beddome t 169, Brandis 128, Kurz 1 322, Gamble 25 The Hog Plum Vern *Amra, amara ambodha*, Hind , *Amara*, Nep , Ass , *Amna*, Beng , *Ronchiling*, Lepcha , *Tongrong*, Gáro , *Kat maa*, Tam , *Aravimamidi, amatum*, Tel *Katambolam* Mal , *Amb*, Mar , *Amte*, Kan , *Hamara*, Gondi , *Ambera* Kurku , *Puli ille*, Kaders , *Gway*, Burm

A deciduous tree, with smooth, grey bail Wood soft, light grey, Pores large, numerous, often subdivided Medullary rays fine and moderately broad, at unequal distances, white, prominent, distinctly marked on a radial section as long narrow plates

Sub Himalayan tract ascending to 3000 feet in Sikkim dry forests of South India and Burma rare in Central India

Weight 13 lbs (Shinner No 116) 60 specimens gave an average of 26 lbs Shinner gives P = 614 Wood soft of no value It gives a gum somewhat like gum arabic the fruit is eaten and is pickled and is preserved or made into curries the leaves are acid

		lbs
C 2800	Melgat Berar	
F 499	Kool loong Forest Darjeeling Terai	30
F 1236	Cyclar (Vern <i>Tundur</i> )	21
F 1197	Syll et (Vern <i>Sutring</i> )	25
B 560	Birna	29

## ORDER XXVII CORIARIÆ

An Order containing one Indian genus of a single species

### 1 CORIARIA, LINN

*C myrtifolia* Linn a shrub of South Europe (*Corroyère* French) has leaves which are used for tanning and dyeing leather its fruit is poisonous *C sarmentosa* is a New Zealand shrub the fruit of which is made into wine by the settlers

1 *C nepalensis*, Wall , Hook Fl Ind n 14, Brandis 128 Vern *Masuri, makola*, Hind , *Raselica, archarru, pajerra*, Simla, *Bhojins* Nep

A deciduous shrub or small tree Bark reddish brown, rough Wood grey, hard, beautifully mottled, no heartwood Annual rings distinct, marked by a belt of numerous moderate sized pores, the pores of the outer portion of the annual rings are small and often joined by interrupted concentric bands of whitish tissue Medullary rays very broad, short

Outer Himalaya from the Indus to Blitar ascending to 8000 feet in the North West and to 11000 feet in Sikkim

Growth moderate 5 to 6 rings per inch of radius Weight 17 lbs per cubic foot The wood takes a good polish and is very handsomely marked so it might be used for boxes and small articles At present it is only used for firewood and is often used as such about Simla

H	Locality	Altitude	lbs
H 69	Makola Simla	7000 feet	44
H 253	Makola	7500 "	3
H 2550	Nakola	8000 "	11

## ORDER XXXVIII. MORINGEÆ.

## 1. MORINGA, Juss.

Wood soft, white. Pores large, scanty, usually in groups of two or three. Medullary rays short, moderately broad.

1. *M. pterygosperma*, Gaertn.; Hook. Fl. Ind. ii. 45; Beddome t. 80; Brandis 129; Kurz i. 68. *Hyperanthera Moringa*, Roxb. Fl. Ind. ii. 368. The Horse Radish Tree. Vern. *Soanjna*, *sanjna*, *senjna*, *sejna*, *sohajna*, *sainjan*, Hind.; *Snjuna*, Beng.; *Swanjera*, Sind.; *Munigha*, Uriya; *Morunga*, Tam.; *Saihan*, *sejan*, *munga*, *mulaka*, Tel.; *Nuggee*, Kan.; *Daintha*, *dan-tha-lone*, Burm.

A tree. Bark one inch thick, grey, corky, with longitudinal cracks. Wood soft, white, spongy, perishable. Wood cells large, prominent. Pores large, scanty, often in groups or short radial lines of two or three. Medullary rays short, fine to moderately broad; the distance between them less than the transverse diameter of the pores.

Wild in the Sub-Himalayan tract from the Chenab to Oudh; commonly cultivated in India and Burma.

The tree is pretty; it is generally grown on account of its fruit, which is eaten as a vegetable and is pickled. The root has a strong flavour of horse radish, and is used in medicine as a vesicant. It yields an oil similar to the *Ben oil* of watch-makers, which is not the produce of this but of another species, *M. aptera*, Gaertn., of Africa. It also gives a reddish gum used in native medicine. The leaves and flowers are eaten as well as the fruit, and the branches are lopped for cattle fodder.

E 3214. Calcutta.

2. *M. concanensis*, Nimmo; Hook. Fl. Ind. ii. 45; Brandis 130. Vern. *Sainjna*, Rajputana.

A tree, bark thick, soft, corky. Wood white, soft, in structure resembling that of *M. pterygosperma*, except that the pores are more variable in size and the medullary rays rather finer.

Rajputana, Sind, Konkan.

Wood apparently not used. The unripe fruit is eaten.

E 3226. Nagpahar, Ajmere.

## ORDER XXXIX. CONNARACEÆ.

An Order of little importance, containing 4 genera of Indian trees and shrubs, found in Eastern Bengal, South India and Burma. *Rourea* contains 5 species, four being scandent shrubs from Eastern Bengal, Tenasserim, and the Andamans; and one, *R. santaloides*, Vahl.; Hook. Fl. Ind. ii. 47; Beddome lxxx. from South India. *Connarus* contains 6 Burmese and two South Indian species: one, *C. paniculatus*, Roxb. Fl. Ind. iii. 139; Hook. Fl. Ind. ii. 52, extending to Chittagong, Sylhet and the Khasia Hills. *Cnestis ramiflora*, Griff.; Hook. Fl. Ind. ii. 54. (*C. platantha*, Griff.; Kurz i. 328.) Vern. *Tankyet louk*, Burm., is a large climbing shrub of Burma; and *Ellipanthus* contains three Burmese shrubs or small trees.

## ORDER XL. LEGUMINOSÆ.

The largest Order of Indian trees, shrubs or climbers. It contains about 70 genera containing species distributed over the whole of India, equally in the arid regions of

the Inner Himalaya and in the tropical forests of Malabar and Tenasserim. Many of the largest and most important of our forest trees belong to this Order, and with few exceptions they produce valuable timbers. It is divided into three Sub-Orders, viz —

- I Papilionaceæ
- II Cæsalpiniæ
- III Mimosaæ

With the exception of the following genera, *Sesbania*, *Butea*, *Erythrina*, *Pongamia*, and a few species of *Dalbergia* (*D. lanceolaria* and *paniculata*), the wood of the Leguminosæ is characterised by a distinct, hard, dark-coloured heartwood. The pores vary in size, but are generally moderate-sized, large or very large, and enclosed in rings or patches of soft texture, which frequently are confluent, so as to form concentric bands. The medullary rays are generally sharply defined, moderately broad and equidistant (exceptions are *Erythrina* and *Albizia*).

As regards the structure of their wood, leguminous trees may be most conveniently divided into the following groups, which it will be seen do not correspond with the established division of the Order into genera —

#### A OUGEINIA GROUP

Pores enclosed in elongated patches of soft tissue, which are arranged in more or less concentric lines. Exceedingly prominent and straight medullary rays. To this group belong *Ougenia dalbergioides*, *Azelia biyuga*, *Tamarindus indica*, *Cassia fistula*, *marginata* and the new *Cassia* from the Andaman Islands.

#### B PROSORIS GROUP

Pores enclosed in irregularly shaped patches of soft tissue, which are more or less united in concentric bands. To this group belong *Prosopis spicigera*, and the following species of *Acacia*, viz *Farnesiana*, *Catechu*, *leucophlœa*, *eburnea* and *pennata*. *Indigofera*, *Piptanthus* and *Desmodium* are nearly allied to this group, but differ by having the patches of soft tissue more oblique and less concentric.

To this group also belongs *Hamatoxylon campeachianum* or "Log-wood."

#### C DALBERGIA GROUP

Numerous, narrow, interrupted. To this group belong *Dalbergia* and *Stemmadia*, sometimes except *D. nigrescens*, the identification of which is doubtful. Species of *Pterocarpus*, *Derris robusta*, *Cæsalpinia crista* or "Redwood," and *Baphia nitida*, the "Camwood" or "Barwood" of the West African Coast.

#### D BAUHINIA GROUP.

Numerous, regularly arranged, broad, confluent, of soft tissue, which are broader than those in the other groups. To this group belong *Pongamia glabra*, all species of *Milletia*, *penulata*, *indica*, *Siamca* and *indica*.

## E. HARDWICKIA GROUP.

Pores isolated, not enclosed in patches of soft tissue, though they are generally surrounded by narrow rings. Concentric bands of soft tissue are either wanting entirely, or very scanty. The medullary rays are generally undulating. To this group belong *Xylia dolabriformis*, *Hardwickia*, *Adenanthera*, *Piptadenia*, *Mimosa*, *Acacia arabica*, *modesta* and *ferruginea*, *Cæsalpinia Sappan* and *echinata* (Brazil or Pernambuco wood).

## F. ALBIZZIA GROUP.

Pores isolated, generally large, not enclosed in patches of soft tissue. None or very few concentric lines of soft tissue. To this group belong all species of *Albizzia*, *Acacia dealbata* and *Melanoxydon*, *Acrocarpus*, *Sesbania*, and *Dalbergia nigrescens*.

## G. ERYTHRINA GROUP.

Pores large. Distinguished by broad medullary rays and broad bands of soft tissue which do not always enclose the large pores. To this group belong all species of *Erythrina*, and *Butea frondosa*.

## SUB-ORDER I. PAPILIONACEÆ.

Contains 35 genera, divided into 8 tribes, viz:—

Tribe	I.—Podalyriæ	. . . . .	<i>Piptanthus</i> .
"	II.—Genistæ	. . . . .	<i>Priotropis</i> and <i>Crotalaria</i> .
"	III.—Galegæ	. . . . .	<i>Indigofera</i> , <i>Colutea</i> , <i>Millettia</i> , <i>Mundulea</i> , <i>Tephrosia</i> , <i>Sesbania</i> and <i>Caragana</i> .
"	IV.—Hedysaræ	. . . . .	<i>Lespedeza</i> , <i>Alhagi</i> , <i>Æschynomene</i> , <i>Ormocarpum</i> , <i>Ougeinia</i> and <i>Desmodium</i> .
"	V.—Viceæ	. . . . .	<i>Abrus</i> .
"	VI.—Phaseoleæ	. . . . .	<i>Mucuna</i> , <i>Erythrina</i> , <i>Spatholobus</i> , <i>Butea</i> , <i>Dioclea</i> , <i>Pueraria</i> , <i>Cajanus</i> , <i>Cylista</i> and <i>Flemingia</i> .
"	VII.—Dalbergiæ	. . . . .	<i>Dalbergia</i> , <i>Pterocarpus</i> , <i>Pongamia</i> and <i>Derris</i> .
"	VIII.—Sophoræ	. . . . .	<i>Dalhousiea</i> , <i>Calpurnia</i> , <i>Sophora</i> , <i>Euohresta</i> and <i>Ormosia</i> .

Many of these, however, contain only small shrubs; such are *Priotropis*, *Crotalaria*, *Colutea*, *Mundulea*, *Tephrosia*, *Caragana*, *Lespedeza*, *Alhagi*, *Æschynomene*, *Ormocarpum*, *Cajanus*, *Flemingia*, *Dalhousiea*, and *Calpurnia*: others only climbing shrubs; such are *Abrus*, *Mucuna*, *Spatholobus*, *Dioclea*, *Pueraria* and *Cylista*.

Of the genera not here described, *Sophora* contains about six species of which *S. mollis*, Wall.; Brandis 132. Vern. *Arghawán*, Afg.; *Gojâr, kûn, mâlan, tilûn, kathi, brisari*, Punjab; *Pahar gûngri*, Kumaun, is a yellow-flowered handsome shrub of the Punjab and North-West Himalaya; and *Ormosia travancorica*, Beddome t. 45, is a tree of the Tinnevely and Travancore Hills.

## 1. PIPTANTHUS, D. Don.

1. *P. nepalensis*, D. Don; Hook. Fl. Ind. ii. 62; Brandis 132; Gamble 25. Vern. *Bankaru*, Sutlej; *Shalgari*, Kumaun.

A shrub with greenish grey bark Wood white Pores small, wavy, oblique and concentric bands, except at the inner edge of the annual rings, which are marked by a continuous line of pores Medullary rays fine, equidistant

Himalaya from the Sutlej to Blutan above 7000 feet

Has handsome large yellow flowers and is sometimes planted for ornament in the hills and in Europe

II 3021 Nagkanda Simla 9000 feet

lb  
40

*Protopsis cytisoides* W and A Kurz 1363 Gamble 20 is a yellow flowered branching shrub of the Eastern Himalaya and Burma *Crotalaria* contains numerous shrubs of which the most important is *C. juncea* Linn the Sunn Hemp Plant commonly cultivated in India

## 2 INDIGOFERA, Linn

Contains a number of Indian species about 16 of which are shrubs Few of them are of any importance except the Indigo Plant *I. tinctoria* Linn Roxb Fl Ind n 379 Brandis 130 Vern Nil Hind C which is extensively cultivated in

1 *I. heterantha*, Wall, Brandis 130 *I. Gerardiana*, Wall Hook Fl Ind n 100 (var) Vern *Kati, khenti, mattu, kati, shagali* Pb, *Kathi, theot*, Simla

A small shrub Bark  $\frac{1}{2}$  inch thick brown, with longitudinal anastomosing lines Wood hard white, with an irregular heartwood of dark colour Annual rings distinctly marked by a white line and by a continuous belt of pores Pores small enclosed in patches of softer texture which frequently join, forming short interrupted concentric bands Medullary rays fine, numerous, almost equidistant

North West Himalaya and eastern skirts of the Suliman Range ascending to 8000 feet.

Growth slow 20 rings per inch of radius Weight 56 lbs per cubic foot The twigs are used for basket work and often form part of the twig bridges of the North West Himalaya

II 2870 Fagu Simla 8000 feet

II 2870 Nagkanda Simla 8000 feet

II 2935 Mahasu Simla 7000 feet

lb  
—  
56

2 *I. atropurpurea*, Ham, Brandis 136 Hook Fl Ind n 101, Roxb Fl Ind n 381 Vern *Banlati, kala sakana, sakna, Hind, khenti, jand, Kaghan, Kathi, gorlati, Kashmir*

A shrub of smaller size, but with wood of structure similar to that of *I. heterantha*

ascet " " " " " " to Nepal,

A moderate-sized deciduous tree, under certain circumstances gregarious. Bark  $\frac{1}{2}$  inch thick, light brown, sometimes with bluish patches, with regular longitudinal and horizontal cracks. Sapwood small; heartwood mottled, light brown, sometimes reddish brown, hard, close-grained; annual rings indistinct. Pores moderate-sized, enclosed in irregularly-shaped, more or less concentric but interrupted patches and bands of white soft tissue. These patches, which are tapering and pointed at the ends, are separated by irregularly-shaped belts of firm and darker-coloured shining tissue, in which the fine and numerous, white, uniform and equidistant medullary rays are distinctly visible. Pores marked on a longitudinal section.

Chiefly in the intermediate zone. Sub-Himalayan tract from the Sutlej to the Tista, ascending to 5,000 feet; Central India and the Western Coast.

Weight, 57 to 60 lbs. (*Brandis*); R. Thompson gives 58; our specimens give an average of 55 lbs. The wood is tough and durable, and takes a beautiful polish. It is used for agricultural implements, carriage poles, wheels and furniture; also for building. The tree gives an astringent red gum; the bark is pounded and used to intoxicate fish; and the branches are lopped for cattle fodder. A crystalline substance, probably magnesia, is sometimes found in the wood (see specimen E 601).

		lbs.
P 102.	Sutlej Valley, Punjab . . . . .	...
O 212.	Garhwal (1868) . . . . .	52
C 185.	Mandla, Central Provinces (1870) . . . . .	53
C 1152.	Ahiri Reserve, Central Provinces . . . . .	54
C 2767.	Melghát, Berar . . . . .	55
C 1212.	Gumsúr, Madras . . . . .	52
E 601.	Lohagarhi, Darjeeling Terai . . . . .	67
W 1226.	North Kanara . . . . .	53

## 6. DESMODIUM, Desv.

Contains a number of shrubs found 'in the forests in almost all parts of India. *D. pulchellum*, Bth.; Hook. Fl. Ind. ii. 162; Brandis 145; Kurz i. 383; Gamble 26 (*Hedysarum pulchellum*, Roxb. Fl. Ind. iii. 361) Vern. *Juta-salpani*, Beng.; *Set krishnapani*, Katak; *Toungtamin*, Burm., is a common erect shrub with the flowers in the axils of bifoliate bracts. *D. gyroides*, DC.; Hook. Fl. Ind. ii. 175; Kurz i. 388; Gamble 27. Vern. *Bolí*, Nep., is an erect, blue-flowered shrub of the Himalayas, Eastern Bengal and Burma; and *D. gyrans*, DC.; Hook. Fl. Ind. ii. 174; Brandis 146; Gamble 27 (*Hedysarum gyrans*, Roxb. Fl. Ind. iii. 351) Vern. *Gora-chand*, Beng., is common in India and Burma, and generally known as the "Telegraph Plant" from its small, sensitive, rotating, lateral leaflets.

1. *D. tiliaefolium*, G. Don.; Hook. Fl. Ind. ii. 168; Brandis 145. Vern. *Sambar*, *shamru*, *chamra*, *chamyár*, *chamkat*, *chamkúl*, *martan*, *motha*, *gurshagal*, *prí*, *marára*, *múss*, *múrt*, *laber*, Hind.

A large deciduous shrub, with thin, grey bark. Wood yellowish brown, with a darker centre. Pores small. Annual rings distinctly marked by a belt of small pores; in the outer part of each annual ring the pores are very small, and generally arranged in short, linear, wavy, concentric lines. Medullary rays white, fine to very fine.

Himalaya, from the Indus to Nepal, between 3,000 and 9,000 feet.

Growth slow, 14 rings per inch of radius. Weight, 53 lbs. per cubic foot. The bark is extensively used for rope-making and paper.

		lbs.
H 3184.	Dungagalli, Hazara, 8,000 feet . . . . .	...
H 51.	Nagkanda, Simla, 7,000 feet . . . . .	...
H 2934.	Mahasu, Simla 7,000 feet . . . . .	53
H 3019.	Kotgarh, Simla, 7,000 feet (var. <i>argenteum</i> , Wall.) . . . . .	...

2. *D. Cephalotes*, Wall.; Hook. Fl. Ind. ii. 161; Beddome lxxxvii; Kurz i. 386; Gamble 26. *Hedysarum Cephalotes* and *umbellatum*, Roxb. Fl. Ind. iii. 360. Vern. *Bodle kúrú*, Nep; *Maniphtyol*, Lepcha; *Chetenta*, Tel.

A shrub with grey bark and yellowish wood, which in structure resembles that of *D. tiliaefolium*.

Eastern Himalaya, South India and Burma

E 3281. Dainah Reserve, Western Dúars.

*Abrus* contains 3 species, of which *A. precatorius*, Linn; Hook Fl Ind ii 175; Roxb Fl Ind iii 258, Brandis 139 Vern *Gunchi*, *rakti*, Hind, *Maspati*, Nep, is a wiry climber, whose seeds (*rakti*) are used as weights by jewellers; they weigh  $1\frac{1}{2}$  to 2 grains each.

*Mucuna* contains 3 species, of which *M. imbr* chief are *M. imbr* with stinging hairs, covered pod, M *macrocarpa*, Wall, r of the hills of Sikkim, Kl ens, DC. The Cowhage Plant, ch, Nep, which is an annual c velvety pod, covered with hair

## 7. ERYTHRINA, Linn.

Contains 7 species of Indian soft wood. *E. lithosperma*, Miq. Vern *Yea kathit*, Burm and *E. holosericea*, Kurz i. 367, are trees of Burma, while *E. resupinata*, Roxb Fl Ind iii. 257; Brandis 141, is a herbaceous plant from a perennial root stock found in the grass lands of the Himalayan Terai.

Wood soft; no heartwood. Pores large, medullary rays broad. Numerous concentric bands of soft texture, which, as a rule, have no connection with the pores.

1. *E. suberosa*, Roxb. Fl. Ind. iii. 253; Hook. Fl. Ind. ii. 189; Beddome lxxxvii.; Brandis 140; Kurz i. 369; Gamble 27. Vern. *Pangra*, *dauldhal*, *ringra*, *rowanra*, *nasút*, *madára*, Hind.; *Gúlnashtar*, *paráara*, *thab*, Pb.; *Pullidha*, Nep; *Mandal*, Gáro; *Katiang*, Lepcha; *Muni*, *maduga*, Tam; *Mulu modugu*, Tel.; *Phangera*, Gondi; *Gada phassa*, Kurku.

A moderate-sized deciduous tree. Outer bark corky, light grey, with deep, irregular, vertical cracks, varying in thickness up to 1 inch; inner bark fibrous,  $\frac{1}{2}$  inch thick. Wood very soft, spongy, white, fibrous but tough; that near the centre of darker colour, but no regular heartwood. Annual rings visible. Pores very large, scanty, often subdivided. Medullary rays short, broad; the tissue between the rays consisting of narrow, hard, wavy and often interrupted, concentric bands of a darker colour, separated by alternate bands of white, spongy tissue. The timber is soft, spongy, and has a vertical section.



Himalaya from the Ravi to Bhutan, ascending to 3,000 feet. Oudh, Central and South India, Burma.

Growth fast, 4 rings per inch of radius. Weight, 13 to 20 lbs. per cubic foot. The wood is used for scabbards, sieve frames, and occasionally for planking. The tree is readily grown from cuttings.

O 530.	Dehra Dún	.	.	.	.	.	.	lbs.
C 1145.	Ahiri Reserve, Central Provinces	:	:	:	:	:	:	20
E 668.	Bamunpokri, Darjeeling Terai	.	.	.	.	.	.	13

**E. indica**, Lam.; Hook. Fl. Ind. ii. 188; Beddome lxxxvii.; Brandis 139; Kurz i. 368; Roxb. Fl. Ind. iii. 249. The Indian Coral Tree. Vern. *Pangra*, *panjira*, *pangara*, *farad*, Hind.; *Palita mandar*, Beng.; *Muruká*, Tam.; *Modugu*, Tel.; *Pangara*, *phandra*, Mar.; *Háliwára*, *páliwára*, Kan.; *Chaldna*, Uriya; *Madar*, Cachar; *Katheik*, Magh; *Peulaykathit*, Burm.; *Dudap*, Malay; *Errabadu*, Cingh. (*Mochi* wood of Madras).

A deciduous tree. Bark yellowish, smooth and shining, peeling off in thin papery flakes, young stems and branchlets armed with prickles. Structure the same as that of *E. suberosa*.

Cultivated throughout India and Burma; wild in Oudh, Bengal, South India and Burma.

Weight, 17 to 26 lbs. per cubic foot according to our specimens, but 18 lbs. is nearest the true weight. Wood rather durable, though it is so light and open-grained it does not warp or split, and it varnishes well. It is used for light boxes, toys, scabbards, trays, and is often grown as a support for and to give shade to the betel pepper vine. It grows readily from cuttings and is used for hedges. It gives a dark-brown gum of no value.

O 820.	Bairagarh Reserve, Berar	.	.	.	.	.	.	lbs.
B 2343.	Myanoun, Burma	.	.	.	.	.	.	17
B 2223.	Andaman Islands (1866)	.	.	.	.	.	.	18
								26

**3. E. arborescens**, Roxb. Fl. Ind. iii. 256; Brandis 140; Gamble 27. Vern. *Rungara*, Kumaun; *Rodinga*, *fullidha*, Nep.; *Gyesa*, Lepcha; *Dingsong*, Khasia.

The wood has a similar structure to that of *E. suberosa* and *Indica*, but it is more compact, less spongy, and has more numerous concentric bands of soft texture.

Outer Himalaya from the Ganges to Bhutan, up to 7,000 feet; Khasia Hills.

It is very handsome when covered with its bright scarlet flowers; it grows easily from cuttings, and is often planted for ornament, as in the avenues at Darjeeling.

F 3106. Darjeeling, 7,000 feet.

E 2344 (16 lbs. per cubic foot) from Bamunpokri, Darjeeling Terai, has been identified as *E. stricta*, Roxb.; Beddome t. 175; Kurz i. 369; Gamble 27. Vern. *Mouricou*, *kichige*, Kan.; *Young kathit*, Burm., described from Western India and Burma. The structure is the same as that of *E. suberosa*.

*Spatholobus Roxburghii*, Bth.; Brandis 143; Gamble 27. (*Butea parviflora*, Roxb. Fl. Ind. iii. 248; Kurz i. 365) Vern. *Mala*, *mula*, *maula*, Hindi.; *Debrelara*, Nep.; *Terolrik*, Lepcha; *Pouknway*, Burm., is a very common gigantic creeper of the forests of the Sub-Himalayan tract from the Jumna eastwards, Bengal and Burma, with trifoliate leaves, white flowers and a soft porous wood in concentric layers separated by a ring of soft tissue exuding a red gum resembling "kino" (E 480, Darjeeling; O 2927, Garhwal, 1874).

## 8. BUTEA, Roxb.

*Butea* *frondosa* (L.) Roxb. *Fl. Ind.* iii. 214; Brandis

1. *B. frondosa*, Roxb. *Fl. Ind.* iii. 214; Hook. *Fl. Ind.* ii. 194; Beddome t. 176; Brandis 142; Kurz i. 364; Gamble 27. Vern. *Dhák, palás, lakria, kankrei, Chickra*, Hind.; *chalcha*, Bandelkhand; *Chúla, puroha*, C. P.; *Palás*, Beng.; *Palási, bulyettra*, Nep.; *Lahokúng*, Lepcha; *Porásu*, Uriya; *Murr*, Gondi; *Pharsa*, Kurku; *Porasan*, Tam.; *Modugu, mohlu*, Tel.; *Muttuga, thoiás*, Kan.; *Parás*, Mar.; *Gasskeala, calukeale*, Singh.; *Pouk*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{4}$  inch thick, fibrous, grey, exfoliating in small irregular pieces; exuding from cuts and fissures a red juice which hardens into a ruby-coloured gum similar to *lino*. Wood dirty white, soft, not durable; no annual rings. Pores large, scanty. Medullary rays broad and moderately broad, white; the darker tissue between the rays is broken up into oblong patches by broad concentric bands of white tissue similar in appearance to the medullary rays; the latter distinctly visible on a radial section as long, irregular bands.

Throughout India and Burma, extending in the North-West Himalaya as far as the Jhelam.

The weight is given by Kyd as 32 lbs. per cubic foot; by Adrian Mendis,

to make slow matches. The resin is as that obtained from the *Myrica*. The seeds are used for buffaloes. The tree is well known from its handsome scarlet flowers, appearing in the hot season before the leaves; they give a yellow dye, which treated with alum is used at the Holi festival.

		lbs.
O 237.	Garhwal (1868)	...
C 1119.	Ahuri Reserve, Central Provinces	...
C 2759.	Moharh Reserve, Central Provinces	36
E 674.	Rakti Forest, Darjeeling Terai	31
E 2315.	Sivoko " " "	40

a climbing shrub of the Andamans; Brandis 111; Gamble 28. (*Hedyotis*) *Sidli, badár, biles land, billi, pona*, with bright

cultivated and for its a climbing contains a number of shrubs found in *F. semialata*, ar.; Hook Fl. Lepcha, a tall; rather broad like that of

## 9. DALBERGIA, Linn. fil.

Contains about 28 Indian species, of which one-half are trees and the other half climbing shrubs. About 8 species are found in North-West and Central India, 13 in the Eastern Himalaya, Assam and Eastern Bengal, 8 in South India, and 18 in Burma. The Genus is divided into sections as follows:—

Pod flattened, winged at the edges—

Staminal bundle split on one side only . . . *Sissoo*.  
 " " " " " two sides . . . *Dalbergia*.

Pod thickened, not winged, falcate . . . *Selenolobium* (*Drepanocarpus* Kurz).

To the section *Sissoo* belong the trees *D. Sissoo*, *latifolia*, *rimosa* and *cultrata* and nine climbing shrubs. To the section *Dalbergia* belong the trees *D. lanceolaria*, *purpurea*, *paniculata*, *glomeriflora* and *hircina* and five climbing shrubs. To the section *Selenolobium* belong *D. spinosa* and *reniformis*, trees or erect shrubs and two climbers.

*D. rimosa*, Roxb. Fl. Ind. iii. 233; Hook. Fl. Ind. ii. 232; Brandis 148, Vern. *Kaogrām*, Sylhet and *D. hircina*, Ham.; Brandis 151. Vern. *Saras*, *bandir*, *tantia*, *gogera*, Hind., are trees found in the Sub-Himalayan tract from the Ganges eastwards. *D. reniformis* Roxb. Fl. Ind. iii. 226; Hook. Fl. Ind. ii. 238. (*Drepanocarpus reniformis*, Kurz i. 336). Vern. *Kures*, Sylhet; *Htoulma*, Burm.; and *D. spinosa*, Roxb. Fl. Ind. iii. 233. Vern. *Yaychinya*, Burm., are small trees of the tidal forests of Burma, the latter species, according to Kurz i. 337, having: "Wood soft, beautifully silvery white, close and straight-grained. The roots powdered absorb alcohol, and a spoonful of the powder in a tumblerful of water is said to be sufficient to destroy in less than half an hour the effects of alcohol, even in cases bordering on delirium tremens." *D. glomeriflora*, Kurz, is a tree of the upper forests of the Pegu Yomas.

Among the climbers, which have mostly a hard wood, the chief are *D. volubilis*, Roxb.; Brandis 152. Vern. *Bhatia*, *bankhara*, Hind., found in the Sub-Himalayan tract; and *D. tamarindifolia*, Roxb.; Gamble 29. Vern. *Damar*, Nep.; *Keti*, Sylhet, of the outer Eastern Himalaya, Eastern Bengal, Burma and the Andamans. *D. monosperma*, Dalz. (*Drepanocarpus monospermus*, Kurz i. 337), is a scandent shrub of tidal forests in Upper Tenasserim. *D. Cumingii*, Bth., is a scandent shrub said by Kurz to give a dyewood, the *Kayu-lakka* of commerce. *D. congesta*, Grah.; and *D. sympathetica*, Nimmo, are climbing shrubs of the hills of South India.

*D. Sissoo*, *latifolia* and *cultrata* have a hard, dark-coloured, heavy heartwood; while *D. stipulacea*, *lanceolaria* and *paniculata* have white wood without heartwood. All *Dalbergias*, with the exception of *nigrescens* (the identification of which is doubtful), have scanty, moderate-sized pores, joined by narrow bands or lines of soft texture. Medullary rays fine, uniform and equidistant.

1. *Dalbergia Sissoo*, Roxb. Fl. Ind. iii. 223; Hook. Fl. Ind. ii. 231; Beddome t. 25; Brandis 149; Gamble 28. The *Sissoo*. Vern. *Shisham*, *sissu*, *sissai*, Hind.; *Shewa*, Pushtu; *Tāli*, *safedar*, *shín*, *nelkar*, Pb.; *Sissai*, Oudh; *Yette*, Tam.

A large deciduous tree. Bark between  $\frac{1}{3}$  and  $\frac{1}{2}$  inch thick, grey, exfoliating in narrow longitudinal strips. Sapwood small, white; heartwood brown with darker longitudinal veins, close and even grained, seasons well, very hard. Annual rings not distinctly marked, alternating dark and light-coloured bands, which run into each other. Pores large and moderate-sized, uniformly distributed, joined by irregular, narrow, wavy, white, concentric bands. Medullary rays white, very fine, uniform and equidistant, numerous. Pores well defined on a longitudinal section.

Sub-Himalayan tract from the Indus to Assam, ascending to 3,000 feet. Van in his "List of Trees of Mysore and Coorg," gives it as occurring in Kanarese name, but it is probably not indigenous in those provinces. The amount of difference regarding the rate of growth of *Sissu* is as yet

The annual rings in the sapwood are, as a rule, fairly distinct; those in the heartwood are generally ill-defined: in either case a lens is required to make them out. The following statement exhibits the rings counted on sections from the Changa-Manga plantation, which were cut in 1877:—

Known age.	Number of rings visible.	Average diameter of section.	Average diameter of heartwood.	Rings per inch.
		Inches.	Inches.	
5 years . . . . .	4	6.75	0.75	1.2
6 " . . . . .	6	3	2	1.5
7 " . . . . .	6	9	3	1.3
8 " . . . . .	6	12	4.5	1
9 " . . . . .	9	10.75	3.2	1.7
10 " . . . . .	6	11	5	1.1
Average rings per inch of average radius . . . .				1.3

ings counted; if we  
5, 1.5, 1.3, 1.7, 1.8,  
these data refer to  
itions on irrigated  
measurements of  
of 1.55 ring per  
is a much faster

irrigated land gave  
to a girth of 4 feet,

*Changa-Manga plantation (Punjab Forest Report, 1870-77, p. 22).*

	Age.	Average height.	Average girth.
	Years.	Ft.	Inches.
Viankara Circle Compartments 6, 5, 8, Block I . . . . .	6	35	23
Manjoki " " 77, to 87 & 99 to 111, Block I . . . . .	4	20	9

*Delhi Bela plantation (Mr. Minnikin's Report, 1878)*

Chandrawál, Compartment I 3 trees . . . . .	7½	25 to 30	15
Kudcia, " III . . . . .	6	20	15
" " IV . . . . .	2	12	6
Jálfar Khan, " IV 6 trees . . . . .	6	...	16.5

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The weight and transverse strength have been calculated by the following experiments :—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar used.		Value of P.
					Ft.	In.	
Cunningham . . . . .	1854	Gwalior . . . . .	48	4	2	1	697
Campbell . . . . .	...	Bengal . . . . .	56	1	6	2	923
Skinner, No. 56 . . . . .	1862	" . . . . .	50	...	3	1½	870
Russell . . . . .	"	" . . . . .	55.5	...	2	1	
Baker . . . . .	1829	Northern Bengal (Cos-sipore, 1819).	49	9	7	2	967
" . . . . .	"	Northern Bengal (Cos-sipore factory).	45	6	7	2	762
" . . . . .	"	Northern Bengal . . . . .	..	8	6	2	734
" . . . . .	"	" . . . . .	...	13	3	1½	709
" . . . . .	"	" . . . . .	...	13	2	1	606
Brandis . . . . .	1864	Bengal . . . . .	49	15	6	2	738
" . . . . .	"	" . . . . .	47	18	6	2	740
" . . . . .	1865-66	" . . . . .	46	9	6	2	787
" . . . . .	"	" . . . . .	47	17	3	1	869
" . . . . .	"	" . . . . .	44	11	2	1	854
" . . . . .	"	" . . . . .	45	14	2	1	919
Smythies . . . . .	1878	Northern India, various places.	48	8	.....	0¾	...

The wood is very durable, seasons well and does not warp or split. It is highly esteemed for all purposes where strength and elasticity are required. Clifford says that "in strength it is only inferior to sál, while in many other useful qualities it surpasses it, and has the advantage of being lighter. For felloes and naves of wheels and carved work of every description, for framings of carriages and similar work, it is unsurpassed by any other wood, owing to its fine seasoning and standing qualities." It is extensively used for boat-building, carts and carriages, agricultural implements, in construction and especially for furniture.

Formerly, it was more extensively used for gun-carriages than it can be at present, owing to the comparatively small supply. With regard to its durability and strength as a wood for wheels, Clifford says, "The wheels of our ordnance carriages have never failed, however arduous or lengthened the service has been on which they have been employed, of which no more striking example can be furnished than the campaign in Afghanistan, about the most trying country in the world for wheels. Some of our batteries served throughout the campaign, went to Baneen and even to the Hindoo Koosh and came back again to India without a break-down, while Royal Artillery wheels-built of the very best materials Woolwich could produce, specially for Indian service, almost fell to pieces after few months' exposure and service on the plains of India."

It has been tried and found to be good for sleepers, and Mr. McMaster in the Proceedings of the Institution of Civil Engineers, vol. xxiii. 1863, says it will be really good for that purpose.

It is much planted as an avenue tree all over India and in forest plantations in the Punjab and Bengal.

							lbs.
P 145.	Giri Valley, Punjab, 3,000 feet	.	.	.	.	.	44
P 884.	Multan, "	.	.	.	.	.	52
P 1205.	Changa-Manga plantation (9 specimens)	.	.	.	.	.	...
P 1347.	Peraghaib and Saila plantations, Jhelum (8 specimens)	.	.	.	.	.	...
O 205.	Garhwal (1868)	.	.	.	.	.	52
O 537.	Dehra Dún	.	.	.	.	.	...
O 1460.	Bahraich, Oudh	.	.	.	.	.	49
O 1486.	Kheri, "	.	.	.	.	.	52

E 675	Rakti Forest Darjeeling Terai	47
E 2347	Sukna " " "	46
E 634	Eastern Duars Assam " " "	42

2 *D. latifolia*, Roxb Fl Ind iii 221, Hook Fl Ind ii 231, Beddome t 24, Brandis 148, Gamble 29 The Blackwood or Rosewood of Southern India Vern *Sitsal*, Beng, Nep, Oudh, *Shisham*, *sissu*, *kalarukh*, *bhotbeula*, *sissu*, Mar, *Sissu*, Guz, *Sirás*, *sissu*, *sirsa*, *sissa*, Mandla, *Sissa*, Uriya, *Iti*, *eruvadi*, Tam, *Jitegi*, *yerugudu*, *jilangi*, Tel, *Biti*, *thodagatti*, Kan, *Bhotuk*, Bhil, *Seris*, Gondi, *Serisso*, Kurku

A deciduous tree attaining a large size in South India Bark  $\frac{1}{2}$  inch thick, grey, with irregular short cracks, exfoliating in thin fibrous longitudinal flakes Sapwood yellow, small, heartwood extremely hard, dark purple, with black longitudinal streaks, no distinct annual rings, but alternating concentric belts of dark and light colour, which, however, run irregularly into each other Pores moderate sized, uniformly distributed, generally joined by narrow, white, wavy interrupted, concentric lines Medullary rays light-coloured, fine, numerous, uniform and equidistant.

Oudh, Eastern Bengal Central and South India

Growth moderate when young, 5 to 9 rings per inch of radius (*Brandis*), some of

following

experiments —

Experiment by whom conducted	Year	Wood whence procured	Weight	Number of experiments	Size of bar	Value of P
Wallich No 53		India	60.5		Ft In In	
Puckle . . .	1869	Mysore	51	4	2 x 1 x 1	1052
Maitland . . .	1863	Anamalais	51		3 x 1½ x 1½	745 to 806
Skinner No 54	1863	Malabar	50		Various	813
Baker	1829	Malabar	55	3	6 x 3 x 2	822
W Thompson . .	1873	Central provinces	55			
Smythies . . .	1879	Various provinces	55	15	"	"

*Brandis* says the value of P may be taken at 950

It is a valuable furniture wood and is exported to Europe from the forests of Kanara and Malabar Wood sent to London for sale in 1878 fetched £13 10s per ton It is also used for cart wheels, agricultural implements and for gun carriages It is good for carving and fancy work and is used for the handles of knives, kukris and other arms It has been used for sleepers Nine sleepers which had been down 7 to 8 years on the Mysore State Railway were found to have, when taken up, 6 good 3 still serviceable, and 1 bad It has been grown in plantations in Malabar and Kanara

lbs

P { 461 467 }	Ajmere . . .		
C 187.	" " " " "		40
C 294	" " " " "		53
C 1116	" " " " "		53
C 2732	" " " " "		52
C 955	" " " " "		53
C 1236	" " " " "		61
C 1303	" " " " "		61
E 192	Khokloong Forest, Darjeeling Terai		"

D 672.	Bamunpokri, Darjeeling Terai	. . . . .	lbs. 50
E 2348.	" " " " " " " "	. . . . .	60
W 1227.	North Kanara	. . . . .	54
W 720.	South "	. . . . .	55
W 855.	" "	. . . . .	49
D 2044.	Mysore	. . . . .	54
D 1072.	North Arcot	. . . . .	57
No. 24.	Salem Collection	. . . . .	62

3. *D. cultrata*, Grah.; Hook. Fl. Ind. ii. 233; Kurz i. 342. Vern. *Tendike*, Burm.

A moderate-sized tree. Bark  $\frac{1}{2}$  inch thick, smooth, with short transverse clefts. Wood purplish black, with darker streaks, with harder wood than, but structure similar to, that of *D. latifolia*.

Burma.

Weight, according to Benson, 83 lbs.; according to Brandis' Burma List, 1862, No. 36, 64 lbs.; our specimens give 69 and 70 lbs. Benson gives, from experiments made with bars  $3' \times 1\frac{1}{4}'' \times 1\frac{1}{4}''$ ,  $P = 1003$ . It is used for wheels, agricultural implements, handles of dahs and spears, and especially for carvings. The sap-wood is very perishable, but the heartwood extremely durable.

B 2521.	Burma (1862)	. . . . .	lbs. 70
B 2728.	Nawing Forests, Prome (1858)	. . . . .	69
B 2697.	Tavoy (Wallich, 1828)	. . . . .	...

4. Specimens marked *Thitpoke* (B2523), collected in Burma in 1862 (Brandis' Burma List, 862, No. 133), have light yellow wood with numerous concentric bands, scanty, large and moderate-sized pores, and very fine, very numerous, uniform and equidistant medullary rays. *Thitpoke* is identified by Kurz as *Dalbergia purpurea*, Wall., Hook. Fl. Ind. ii. 235; Kurz i. 344; which has a small heartwood. To this also belongs B 2230 from the Andaman Islands.

5. *D. lanceolaria*, Linn.; Hook. Fl. Ind. ii. 235; Brandis 151; Gamble 29. *D. frondosa*, Roxb. Fl. Ind. iii. 226; Beddome lxxxviii. Vern. *Takoli*, *bithua*, Hind.; *Bander siris*, Nep.; *Barbat*, *parbati*, Banskwarra; *Gengri*, Panch Mehals; *Harrani*, Dharwar; *Nal valanga*, Tam.; *Pedda sopara*, *yerra patsaru*, *pasarganni*, Tel.; *Dandous*, *kaurchi*, Mar.

A deciduous tree. Bark  $\frac{1}{4}$  inch thick, compact, grey, smooth, exfoliating in thin rounded patches. Wood white, moderately hard, not durable, no heartwood. Annual rings (?) marked by thin, concentric lines. Pores scanty, large and moderate-sized, larger and somewhat more numerous in the spring wood; often oval and subdivided, very prominent on a longitudinal section. Medullary rays extremely fine, very numerous, very regularly distributed, joined by very fine, short, white bars.

Sub-Himalayan tract from the Jumna eastwards, ascending to 2,500 feet, Central and South India.

Skinner, No. 53, gives for the weight 62 lbs. per cubic foot; Wallich 46 lbs.; our specimens give only 33 to 44 lbs. Skinner also gives  $P = 1003$ , but it is probable that he has not described the right wood, for, although he gives the correct Telugu name, yet he calls his specimens (No. 53, p. 75) *Moukshow*, Burm., and "Moulmein lance-wood;" while Kurz, the latest authority, does not give *D. lanceolaria* as occurring in Burma. Skinner says that one log was brought from the western coast, and another by Conductor Bowman from Burma. Beddome says the timber is useful for building purposes.

		lbs
C 1144	Ahri Reserve, Central Provinces . . . . .	—
E 618	Champasari Forest, Darjeeling Terai . . . . .	33
E 2346	Bamunpokri, Darjeeling Terai . . . . .	41

6. *D. paniculata*, Roxb. Fl. Ind. iii. 227; Hook. Fl. Ind. ii. 236; Beddome lxxxviii.; Brandis 150; Kurz i. 345. Vern. *Katsirsa*, Oudh; *Dhobein*, *dhohain*, *pási*, *satpuria*, Hind; *Patchalai*, *ralange*, Tam.; *Potrur*, *porilla*, *patsuru*, *loper*, Tel.; *Sondarra*, *sheodur*, *topia*, Mar.; *Hasur guniri*, *pachári*, Kan.; *Piangani*, Mal.; *Tapoulben*, Burm.; *Padri*, Gondi, Bhíl, *Phassi*, Kurku.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, compact, grey, smooth, with occasional horizontal cracks. Wood yellowish or greyish white, soft, perishable, no heartwood. Structure most remarkable, entirely different from that of other species of the genus: broad concentric masses of wood alternate with narrow, dark coloured belts of a fibrous substance, resembling the inner bark. Planks cut out of old trees fall to pieces. Pores small, scanty. Medullary rays very fine, numerous. Wavy, narrow, concentric bands of white tissue alternate with broader bands of harder and darker substance.

North-West Himalaya from the Jumna to Oudh, Central and South India. (Quoted by Kurz from Burma, but identification doubtful)

purposes.

C 1115	Ahri Reserve, Central Provinces . . . . .	54
C 2928	Seoni, Central Provinces . . . . .	45

7. *D. nigrescens*, Kurz i. 346. Vern. *Thitsanneng*, Burm.

A moderate-sized deciduous tree. Wood light grey, soft. Pores scanty, large, subdivided. Medullary rays very fine, very numerous.

Dry mixed forests of Upper Burma

B 291	Burma (1867) . . . . .	124
B 2522	" (1862) . . . . .	124

There is some doubt about the identification of this species, even from the concentric bands.

8. *D. stipulacea*, Roxb. Fl. Ind. iii. 233; Hook. Fl. Ind. ii. 236; Kurz i. 346, Gamble 29. Vern. *Tatehri*, Nep.; *Satanthi*, *Tón-nyok*, Lepcha.

A large climbing shrub. Wood soft, greenish grey, with a brown heartwood, porous. Pores numerous, of ~~different sizes~~ extremely large, in white, undulating, ~~concentric bands~~ other. Medullary rays white, fine, very numerous.

Eastern Himalaya, ascending to 4000 feet from ~~the base of the~~ Burma.

Weight, 48 lbs per cubic foot. Growth about 1 inch per foot of ~~height~~

E 571	Khookloong Forest, Darjeeling Terai . . . . .	74
E 2349	Sivoke " . . . . .	—

9. *D. foliacea*, Wall; Hook. Fl. Ind. ii. 237  
29. Vern. *Tatehri*, Nep.



A large straggling shrub, with white porous wood with a small dark heartwood, in structure ressembling that of *D. stipulacea*, except that the medullary rays are broader.

Eastern Himalaya and Burma.

E 3274. Múraghát Reserve, W. Dúars.

## 10. PTEROCARPUS, Linn.

Contains 4 Indian species. *P. macrocarpus*, Kurz i. 349; Hook. Fl. Ind. ii. 239, is a deciduous tree of the Eng and upper mixed forests of Martaban and Tenasserim, rare in Prome. The "Rosewood" or "Lancewood" of West Africa is produced by *P. erinaceus*, Poir.

The wood of the three species examined is very uniform in structure, though the colours differ. They all have extremely fine, uniform and equidistant medullary rays, large and small pores, and fine, wavy, concentric bands.

1. *P. indicus*, Willd.; Hook. Fl. Ind. ii. 238; Beddome t. 23; Kurz i. 349. *P. dalbergioides*, Roxb. Fl. Ind. iii. 236. Andaman Redwood. Vern. *Padouk*, Burm.; *Chalanga-dá*, And.

A lofty tree, sometimes evergreen, with grey bark. Sapwood small; heartwood dark red, close-grained, moderately hard to hard, with a slight aromatic scent. Pores scanty, small to large, sometimes oval and subdivided. Very fine, white, wavy, interrupted, concentric lines, irregularly distributed. Medullary rays extremely fine, very numerous, uniform and equidistant. The transverse diameter of the pores much larger than the distance between the rays.

Burma and the Andaman Islands.

The weights of our specimens from Burma differ considerably from those from the Andamans, the latter being much lighter, the wood softer and the colour rather lighter. The weight and transverse strength have been determined from the following experiments:—

EXPERIMENT BY WHOM MADE.	Year.	Wood whence procured.	Weight.	Number of experi- ments.	Size of bar.	Value of P.
Simpson . . . .	...	Tenasserim	62	...	Ft. in. in. 3 × 1½ × 1½	781
" . . . .	...	"	81	...	3 × 1½ × 1½	1,575
Benson . . . .	...	"	71	...	3 × 1½ × 1½	1,033
Skinner, No. 110 . . . .	1862	Burma	56	...	Various	864
Maitland . . . .	"	"	57	...	3 × 1½ × 1½	620 to 1,122
Brandis, No. 39 . . . .	"	"	60	...	.....	.....
Smythies . . . .	1878	"	60	3	.....	.....
" . . . .	"	Andamans	48	4	.....	.....
Bennett, No. 1 . . . .	1872	"	49.5	...	.....	827

Used for furniture, carts, gun-carriages and other purposes. It is said to be the most useful wood in the Andamans, where it grows to an enormous size. Major Protheroe describes a tree felled in 1876 with a clear stem of 65 feet and a girth of 17 feet, and says that the wood of the root is closer-grained, darker-coloured and more beautifully marked than that of the stem. The plank sent to the Paris Exhibition of 1878 measured nearly 4 feet across. In London, a portion of the same log from which the plank was cut fetched a price of £17-10s. per ton, or nearly Rs. 4 per cubic foot, while three logs lately sold in Calcutta fetched Rs. 60 per ton. Furniture made from Padouk wood and exhibited at Paris in 1878 by Messrs. Jackson and Graham was much admired. They reported on it as follows:—

"This is a straight-grown wood, with rather a coarse open grain, but without any strong figure or markings. When first cut it is of a reddish brown colour, but it fades

to much the same colour as teak—a wood it resembles very much, and it is about as

"kind per a export		kind of gum 7 mature trees available for	
B 581	Martaban		lbs
B 2524	Pegu (1862)		60
B 2708	Tavoy (Wallich, 1828)		60
B 2716	" ( " )		62
B 526	Andaman Islands		59
B 2207	" " (1866)		46
B 2494	" " (Home, 1874, No 1)		43
			55

2. *P. santalinus*, Linn. f.; Hook. Fl. Ind. ii. 239; Roxb. Fl. Ind. iii. 234; Beddome t 22; Brandis 153. The Red Sanders Tree. Vern. *Lal chandan*, *rakta chandan*, *seyapu chandanum*, Tam., Tel.; *Honné*, Kan.

A small tree. Sapwood white; heartwood purplish black, dark-orange red when fresh cut, extremely hard, the shavings giving a blood-red orange colour. Pores moderate-sized, often subdivided, scattered. Medullary rays fine, numerous, equidistant, wavy. The pores are joined by many fine, white, undulating, concentric lines at unequal distances.

South India, chiefly in Cuddapah, North Arcot and the southern portion of the Karnul district

5 inches in height and high is fast, but the tree In Captain Campbell-mentions a tree having

mens give 76 to 77 lbs ing purposes and for as a dyewood, as it contains a red colouring principle, "santalin," which is soluble in alcohol and ether, but not in water. Dissolved in alcohol, it dyes cloth a beautiful salmon-pink colour. It is used in medicine by the natives as an astringent, but does not seem to have much value.

Regarding the method of planting the "Red Sanders" Tree, the following memorandum by Mr. Yarde was published at page 98 of the Report of the Forest Conference Meeting in 1875—

it feet light nt to of the

Seeds soaked for a night in cold water germinate in 20 to 25 days, while those unsoaked take from 30 to 35. After germination has taken place, the beds must be moderately watered by a picotta or other means, with small communicating or distribution channels made between the beds. During the first six months particular care is required, as the tree is very g-can equally destructive as none e best guide, as they seem

from the top weight of is sufficient to strack when the p

nursery' are about six months old, they may be safely transferred to wicker or bamboo baskets, which must be done during the rains. They must be carefully removed with pointed instruments, so that their tap-roots are not injured or broken. The wicker baskets with the plants should be placed in a shady spot and watered every second or third day, and when it is perceived that the roots have taken firm hold, and the plants quite revived, the baskets should be buried in pits 1' × 1' × 2' at about five or six feet apart, and watered till the rains set in. During the time the plants are in the nursery, as a protection from the sun, I always found Pervian cotton, planted near or around, very beneficial. Of course any shade will suit the purpose required."

D 2066.	Mysore	. . . . .	lbs.
D 2917.	Madras (Brandis)	. . . . .	76
D 1075.	North Arcot (with sapwood)	. . . . .	...
D 3151.	Cuddapah, Madras	. . . . .	66
			77

3. *P. Marsupium*, Roxb.; Fl. Ind. iii. 234; Hook. Fl. Ind. ii. 239; Beddome t. 21; Brandis 152. Vern. *Bija*, *bijasár*, *bijasál*, *piasal*, Hind.; *Byasa*, Uriya; *Dhorbeula*, *ásan*, Mar.; *Peddei*, Gondi; *Peddagi*, *yeanga*, *yeggi*, *yegísa*, *pedéga*, *pedéi*, Tel.; *Vengai*, Tam.; *Benga*, *honné*, Kan.; *Bijaira*, Bijeragogarh; *Radat bera*; Bhíl.

A large deciduous tree. Bark  $\frac{1}{3}$  inch thick, grey, with long vertical cracks, exfoliating in small pieces of irregular shape and size. Sapwood small; heartwood brown, with darker streaks, very hard, durable, yielding a red resin. Pores moderate-sized and large, often subdivided, uniformly distributed. Numerous fine, white, wavy, concentric lines at regular intervals. Medullary rays extremely fine and numerous; not visible except under a lens, uniform and equidistant, prominent on a radial section. Pores marked on a vertical section; the transverse diameter of the pores many times larger than the distance between the rays.

Central and South India, extending northwards to the Banda District of the North-Western Provinces.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	No. of experiments.	Size of bar used.	Value of P.
					Ft. in. in.	
Wallich, No. 224 . . . .	...	Travancore . . . .	47	...	.....	...
Puckle . . . . .	1859	Mysore . . . . .	56	...	.....	...
			51	...	2 × 1 × 1	821
Skinner, No. 111 . . . .	1862	South India . . . .	56	...	...	868
French . . . . .	1861	Madras (Erode workshops).	...	3	1 × 1 × 1	511
Baker (Nos. 501 to 504) .	1829	Baggri Forest, Midnapore . . . .	63	4	7 × 2 × 2	687
Smythies . . . . .	1878	Different places . .	52	10	.....	...

The wood is durable, seasons well and takes a fine polish; the heartwood is full of gum resin and stains yellow when damp. It is much used for doors and window frames, posts and beams, furniture, agricultural implements, cart and boat building. It has also been used for sleepers. Out of 25 sleepers which had been down 7 to 8 years on the Mysore State Railway, there were found, when taken up, 9 good, 11 still serviceable and 5 bad. It has also been used to a certain extent on the Holkar and Neemuch and other lines. It yields, from wounds in the bark, a red gum-resin called "kino," a valuable astringent, much used in medicine.

C 175	Mandla, Central Provinces (1870)	lbs
C 1105.	Ahuri Res rve, Central Provinces	47
C 2741.	Moharli Re-erve, Central Provinces	68
C 2918	Seoni, Central Provinces	49
C 1238.	Gumsúr, Madras	56
W 742	South Kanara	56
W 752	" "	48
W 850	" "	45
D 1061	South Arcot	53
D 1086	Madura	50
No 39	Sakm Collection	52

## 11. PONGAMIA, Vent.

1 *P. glabra*, Vent ; Hook. Fl Ind. ii. 240, Beddome t 177; Brandis 153, Kurz i. 335. *Galedupa indica*, Lam.; Roxb Fl Ind. iii. 239. Vern. *Karany*, *papar*, Hind ; *Dalkaramcha*, *karanya*, Beng.; *Koranjá*, Uriya; *Pongá*, Tam ; *Kunga*, *pungu*, *laniga*, *ganuga*, Tel ; *Garany*, Gondi; *Charr*, Ajmere, *Húngay*, *pong*, Kan ; *Thinwin*, Burm.

A moderate-sized tree, almost evergreen. Bark soft,  $\frac{1}{2}$  inch thick, greyish brown, covered with small tubercles. Wood moderately hard, white, turning yellow on exposure. Annual rings indistinct. Pores moderate sized, scanty, included in and joined by white, wavy, concentric anastomosing bands of soft tissue, which alternate with bands of darker colour and firmer texture. In the darker-coloured bands the fine, white, numerous and uniformly distributed medullary rays are distinctly visible



leaves are used for manure for rice-fields in Mysore The tree is easily grown from cuttings.

P 457.	Ajmere	lbs
C 1133	Ahuri Reserve, Central Provinces	45
E 411	Sundarbans	38
		13

## 12. DERRIS, Loureiro.

*D. robusta*, Bth.; Hook. Fl. Ind. ii. 241; Brandis 151; Kurz i. 338. *Dilbergia Krowee*, Roxb. Fl. Ind. iii. 229. Vern. *Morchitta*, Ass ; *Bollakirú*, Gáro; *Krowee*, Sylhet; *Gurilong*, Magh. *D. robusta*, Beng., is a large evergreen scandent shrub of the tidal forests of Bengal and Burma, whose stems are used in the Sundarbans for tying logs to boats. Several other species, all climbing, occur in Burma, chiefly in tidal forests

1. *D. robusta*, Bth.; Hook. Fl. Ind. ii. 241; Brandis 151; Kurz i. 338. *Dilbergia Krowee*, Roxb. Fl. Ind. iii. 229. Vern. *Morchitta*, Ass ; *Bollakirú*, Gáro; *Krowee*, Sylhet; *Gurilong*, Magh.

A deciduous tree. Wood light brown, hard. Pores large and moderate-sized. Medullary rays prominent, fine, wavy, equidistant. Numerous narrow, wavy, concentric bands of soft texture frequently joining the pores.

Outer Himalaya from the Ganges eastwards, Assam, Eastern Bengal, down to Pegu.

Weight, 53 lbs. per cubic foot. Roxburgh says it grows quickly to a large size.

E 786. Kamrúp, Assam	. . . . .	lbs.
		53

*Dalhousiea bracteata*, Wall.; Hook. Fl. Ind. ii. 248; Wight Ic. t. 265, is a shrub of the Khasia Hills and Eastern Bengal. *Calpurnia aurea*, Lam.; Hook. Fl. Ind. ii. 251; Beddome lxxxix., is a handsome shrub of the hills of South India. *Euchrista Horsfieldii*, Bennett; Hook. Fl. Ind. ii. 248, is an erect shrub of the Khasia Hills.

## SUB-ORDER II. CÆSALPINIÆ.

Contains 17 genera, divided into 5 tribes, viz.,—

Tribe I.—Eucæsalpinieæ . . . . .	<i>Peltophorum</i> , <i>Mezoneurum</i> , <i>Cæsalpinia</i> , <i>Pterolobium</i> , <i>Acrocarpus</i> , <i>Wagatea</i> , <i>Poinciana</i> and <i>Parkinsonia</i> .
„ II.—Cassiæ . . . . .	<i>Cassia</i> .
„ III.—Bauhiniæ . . . . .	<i>Bauhinia</i> .
„ IV.—Amherstieæ . . . . .	<i>Amherstia</i> , <i>Humboldtia</i> , <i>Afzelia</i> , <i>Tamarindus</i> and <i>Saraca</i> .
„ V.—Cynometreæ . . . . .	<i>Hardwickia</i> and <i>Cynometra</i> .

*Mezoneurum* and *Pterolobium* contain only climbing shrubs. The former has three species: *M. cucullatum*, W. and A.; Brandis 155; Kurz i. 409; Gamble 30. (*Cæsalpinia cucullata*, Roxb. Fl. Ind. ii. 358) Vern. *Biskoprah*, Oudh; *Sungray*, Nep.; *Runggong*, *yangkup*, Lepcha; *Ragi*, Bombay; *Kyoungchet*, Burm., a large climber whose stems and branches are armed with strong hooked prickles with a corky base, with porous wood, and found in the Sub-Himalayan tract from the Sarda eastwards, Western Ghâts and Burma (E. 488, Darjeeling Terai); *M. enneaphyllum*, W. and A.; Hook. Fl. Ind. ii. 258, a climber of Cachar, Chittagong and Burma; and *M. glabrum*, Desf., a large climber of Pegu. The latter has one species, *Pterolobium indicum*, A. Rich.; Hook. Fl. Ind. ii. 259 (*P. macropterum*, Kurz i. 410. *Cæsalpinia lacerans*, Roxb. Fl. Ind. ii. 367) Vern. *Walekadûda*, Tel.; *Kyoungyet-nyay*, Burm., a prickly climber of Burma. The remaining genera contain chiefly trees.

*Peltophorum ferrugineum*, Bth.; Hook. Fl. Ind. ii. 257; Kurz i. 408, is an evergreen tree of the coast forests of the Andamans, said by Kurz to have a blackish heart-wood. *Poinciana* contains one indigenous tree, *P. elata*, Linn.; Hook. Fl. Ind. ii. 260; Roxb. Fl. Ind. ii. 355; Beddome t. 178; Brandis 157; Vern. *Padenarayan*, Tam.; *Sunkeswar*, Tel.; *Nirangi*, Kan., found in the forests of South India, but more often seen planted. Skinner, No. 106, says it has wood of a yellow colour, tolerably close and even grained, easily worked, and giving a smooth surface, warping slightly, but not subject to crack, well suited for cabinet work; and that its weight is 45 lbs. per cubic foot, and P = 516. It also contains *P. regia*, Bojer, the well-known ornamental tree with crimson and orange flowers appearing in the hot season. It was introduced from Madagascar, and is now found planted almost all over India. Kurz says the wood is white, soft, light and loose-grained, and that the tree gives a plentiful gum. *Parkinsonia aculeata*, Linn. Hook. Fl. Ind. ii. 260; Beddome xci.; Brandis 158; Kurz i. 403, is an introduced shrub or small tree, now almost naturalised in India, especially in the arid zone, where it is grown as a hedge plant. The wood is whitish, light and soft, but close-grained and

polishes fairly Skinner, No 102, gives  $W=40$ ,  $P=565$  *Wagatea spicata*, Dalz ;  
of the Western Ghâts *Amherstia nobilis*,  
Vern *Thawka, soka*, Burm, perhaps the  
old, was discovered by Mr Crawford and  
ey, it is now cultivated in gardens round  
propagated by layers *Humboldtia* contains

Altogether, there is scarcely any class of trees with such a variety of species  
with handsome flowers and generally, at the same time, valuable wood as the sub order  
*Cæsalpinieæ*. Besides the Indian genera there are numerous others of value such as

the Punjab

### 13. CÆSALPINIA, Linn.

Contains 10 shrubs, chiefly climbing and prickly. *C Bonducella*, Roxb Fl  
Ind. ii 357, Hook. Fl Ind. ii 251 Brandis 156, Gamble 30 The Fever Nut  
Vern *Katkarany*, Hind, *Nata*, Beng, *Gajhar*, Kan, is a common very prickly  
climbing shrub of India, often used for hedges. Its seeds are used in medicine, and  
contain an oil; they are tonic and antiperiodic. *C sepiaria*, Roxb Fl Ind ii 360;  
Hook Fl Ind ii 256, Brandis 156, Kurz i 406 The Mysore Thorn Vern *Urn*,  
*uri*, *arlu*, *relu*, *Lando*, *ala*, Hind, *Chillar*, Mai., *Hotungé*, Kan, is a large prickly  
climber used for hedges. *C pulcherri*

No 32)

1. *C. Sappan*, Linn.; Hook. Fl. Ind. ii. 255; Roxb. Fl. Ind. ii. 357;  
Beddome xc.; Brandis 156; Kurz i. 405. Vern. *Bakam*, Hind, Guz.,  
Beng.; *Patunga*, Tam; *Bakamu, bakapu*, Tel.; *Bokmo*, Uruya; *Pattang*,  
Mar.; *Patanga*, Kan.; *Teing nyet*, Burm.

A small thorny tree. Sapwood white, heartwood red. Pores isolated,  
enclosed in narrow rings. Medullary rays fine; the distance between the  
rays equal to, or somewhat larger than, the transverse diameter of the  
pores.

South India, Bengal and Burma

Weight, according to Skinner No 33, 60 lbs. per cubic foot, Wallich gives 61 lbs.  
Skinner gives  $P=15101$  The wood takes a fine polish and does not warp or crack,  
it yields a valuable dye, which is largely exported. It has been grown in plantations at  
Nilambár and in the Central Provinces.

C 3136 Mobarli, Central Provinces (cultivated) (sapwood) . . . lbs  
53

### 14. ACROCARPUS, Wight.

A genus placed by Baker in *Flora Indica*, Vol ii, under *Mimosæ*, but by  
Benthham and Hooker in the *Genera Plantarum* as here described

1. *A. fraxinifolius*, Wight; Hook. Fl. Ind. ii. 292; Beddome t. 41;  
Brandis 158; Kurz i. 410; Gamble 30. Vern. *Mardania*, Nep.;  
*Madling*, Lepcha; *Malliy lone*, Tinnevely; *Kilingi*, R  
*telanji, karnlige*, Kan.

A lofty deciduous tree, with thin, light-grey bark. Sapwood white, heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section. Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet;  
South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

E 667.	Lama Gumba Forest, Darjeeling	.	.	.	.	.	.	lbs.
D 1085.	Madura, Madras	.	.	.	.	.	.	39
		.	.	.	.	.	.	39

15. CASSIA, Linn.

A large genus containing 18 species of herbs, shrubs and large trees. It is of considerable importance, as the trees produce fine timber and some of the shrubs and herbs the "Senna" leaves used in medicine. *C. auriculata*, Linn.; Hook. Fl. Ind. ii. 263; Brandis 165, Vern. *Tarwar*, *awal*, Hind.; *Tarota*, Berar; *Tangedu*, *tangar*, Tel.; *Avarike*, Kan., is a shrub of Central and South India; its bark is used for tanning and dyeing leather, and its seeds as an application for ophthalmia, as are those of *C. Absus*, Linn. *C. obovata*, Colladon, is a shrub common all over India, and is one of the plants furnishing the medicinal senna leaves. *C. alata*, Linn., is an introduced shrub, now run wild, whose leaves are an excellent application for ring-worm.

*C. glauca*, Lam.; Hook. Fl. Ind. ii. 265; Beddome xci.; Kurz i. 394, (*Senna arborescens*, Roxb. Fl. Ind. ii. 345) is a large shrub or small tree of the eastern part of South India and of Burma. *C. nodosa*, Ham.; Kurz i. 392. Vern. *Gnoothain*, Burm., and *C. renigera*, Wall. Vern. *Gnooshay*, Burm., are large trees of Burma, the former extending to the Eastern Himalaya.

Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. *C. Fistula*, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula*, Pers. The Indian Laburnum. Vern. *Amallás*, Hind.; *Alash*, *ali*, *karangal*, *kiár*, *kaniár*, Pb.; *Raj briksh*, *kitola*, Kumaun; *Chimkani*, Sind.; *Gurmala*, Guz.; *Sundali*, *bandarlatti*, Beng.; *Sandari*, Uriya; *Kitwáli*, *kitoli*, *itola*, *shimarra*, *sím*, North-Western Provinces; *Warga*, Oudh; *Jaggarwah*, *raita*, *hirojah*, *karkacha*, C. P.; *Jaggra*, *kambar*, *rera*, Gondi; *Banag*, *bangru*, Kurku; *Bahawah*, *baya*, *bawa*, Mar.; *Raj birij*, Nep.; *Sonalu*, Gáro; *Bonurlati*, *bonurlauri*, *persar*, Palamow; *Sunaru*, Assam; *Bandolat*, Cachar; *Kone*, *sirikone*, Tam.; *Reylu*, *rela*, *suvarnam*, *konay*, Tel.; *Kaki*, Tam.; *Kakke*, Kan. *Ahalla*, Cingh.; *Gnooshway*, *gnoogyee*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{4}$  inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heart-wood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue. Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands.

Sub-Himalayan tract, ascending to 4 000 feet, and throughout India and Burma. Growth moderate, 9 rings per inch of radius.

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of F
Kyd		Assam	50		Ft In In 2 x 3 x 1	598
Eklander No 43	1863	South India	61			846
R Thompson	1808	Central Provinces	62			
Brandis Nos 33 and 34	1862	Burma	57 68			
Central Provinces List	1873	Central Provinces	66			
Smythies	1878	Different Provinces	60	11		

The wood is very durable, but rarely of sufficiently large size for timber. It makes

two feet long. It is often cultivated for ornament.

		lbs
P 101	Sutlej Valley, Punjab 3 000 feet	—
P 437	Ajmere	—
P 439		61
O 211	Garhwal (1868)	52
O 333	Gorakhpur (1868)	52
C 1151	Ahira Reserve Central Provinces	56
E 579	Lohagarhi Forest Darjeeling Terai	62
F 2352	Bamunpokri, Darjeeling Terai	62
F 783	Kamrup Assam	60
W 861	South Kanara	62
D 2052	Mysore	58
D 1076	North Arcot, Madras	73
B 2325	Burma (1862)	66

The difference between the wood of this tree and that of *Ougeinia dalbergioides* consists in this, that in the former the patches of white soft belts, whereas in *Ougeinia* they are rhombiform interrupted belts.

Ind n 334, Hook. Ind n 262  
t 180 Vern. *Urimidi, uskiamen, Tel*,

*Ngoomee*, Burm, *Ratoo-kaa*, Cingh

A small deciduous tree, with deeply cracked, brown bark. Heartwood light brown, very hard. Pores moderate-sized and large, joined by narrow, undulating, irregular, white bands of soft tissue. Medullary rays fine and very numerous, uniform and equidistant, prominent in the



A lofty deciduous tree, with thin, light-grey bark. Sapwood white; heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section. Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet; South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

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Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. *C. Fistula*, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula*, Pers. The Indian Laburnum. Vern. *Amaltás*, Hind.; *Alash*, *ali*, *karangal*, *kiár*, *kaniár*, Pb.; *Raj briksh*, *kitola*, Kumaun; *Chimkani*, Sind.; *Gurmala*, Guz.; *Sundali*, *bandarlali*, Beng.; *Sandari*, Uriya; *Kitwáli*, *kitoli*, *itola*, *shimarra*, *sím*, North-Western Provinces; *Warga*, Oudh; *Jagarwah*, *raila*, *hirojah*, *karkacha*, C. P.; *Jaggra*, *kambar*, *rera*, Gondi; *Banag*, *bangru*, Kurku; *Bahawah*, *baya*, *bawa*, Mar.; *Raj birij*, Nep.; *Sonatu*, Gáo; *Bonurlati*, *bonurlauri*, *persar*, Palamow; *Sunaru*, Assam; *Bandolat*, Cachar; *Kone*, *sirikone*, Tam.; *Reylu*, *rela*, *suvarnam*, *konay*, Tel.; *Kaki*, Tam.; *Kakke*, Kan. *Ahalla*, Cingh.; *Gnooshway*, *gnoogyee*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{4}$  inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue. Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands.

and throughout India and Burma  
 been determined by the following  
 experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
Kyd		Assam	56		Ft. In. In. 2 x 1 x 1	593
Skinner, No 43	1902	South India	61			845
R Thompson	1903	Central Provinces	52			
Brandie Nos 33 and 34	1902	Burma	57 68			
Central Provinces List	1873	Central Provinces	66			
Smythies	1873	Different Provinces	60	11		

two feet long It is often cultivated for ornament

			lbs
P 101	Sutlej Valley, Punjab	3 000 feet	---
P 437	Ajmere		
P 439			61
O 244	Garhwal (1868)		52
O 343	Gorakhpur (1869)		52
C 1154	Ahri Reserve	Central Provinces	56
E 579	Lohagarhi Forest,	Darjeeling Terai	62
F 2352	Bamunpokri,	Darjeeling Terai	62
F 783	Kamrup	Assam	60
W 864	South Kanara		62
D 2052	Mysore		58
D 1076	North Arcot,	Madras	73
B 2525	Burma	(1862)	66

The difference between the wood of this tree and that of *Ougeinia dilbergioides* consists in this, that in the former the patches of white soft tissue are continuous, forming belts, whereas in *Ougeinia* they are rhomboidal, pointed at the ends, and form interrupted belts.

2. *C. marginata*, Roxb. Fl Ind ii 334, Hook Fl Ind ii 262  
*C Roxburghii*, DC, Beldome t 180 Vern *Uruidi*, *ushiamen*, Tel,  
*Ngoorie*, Burm., *Ratoo-kaa*, Singh.

A small deciduous tree, with deeply cracked, brown bark. Heartwood light brown, very hard. Pores moderate-sized and large, joined by narrow, undulating, irregular, white bands of soft tissue. Medullary rays fine and very numerous, uniform and equidistant, prominent in the

A lofty deciduous tree, with thin, light-grey bark. Sapwood white; heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section. Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet; South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

E 667.	Lama Gumba Forest, Darjeeling								lbs.
D 1085.	Madura, Madras	.	.	.	.	.	.	.	39
		.	.	.	.	.	.	.	39

## 15. CASSIA, Linn.

A large genus containing 18 species of herbs, shrubs and large trees. It is of considerable importance, as the trees produce fine timber and some of the shrubs and herbs the "Senna" leaves used in medicine. *C. auriculata*, Linn.; Hook. Fl. Ind. ii. 263; Brandis 165, Vern. *Tarwar*, *awal*, Hind.; *Tarota*, Berar; *Tangedu*, *tangar*, Tel.; *Avarike*, Kan., is a shrub of Central and South India; its bark is used for tanning and dyeing leather, and its seeds as an application for ophthalmia, as are those of *C. Absus*, Linn. *C. obovata*, Colladon, is a shrub common all over India, and is one of the plants furnishing the medicinal senna leaves. *C. alata*, Linn., is an introduced shrub, now run wild, whose leaves are an excellent application for ring-worm.

*C. glauca*, Lam.; Hook. Fl. Ind. ii. 265; Beddome xci.; Kurz i. 394, (*Senna arborescens*, Roxb. Fl. Ind. ii. 345) is a large shrub or small tree of the eastern part of South India and of Burma. *C. nodosa*, Ham.; Kurz i. 392. Vern. *Gnoothein*, Burm., and *C. renigera*, Wall. Vern. *Gnooshay*, Burm., are large trees of Burma, the former extending to the Eastern Himalaya.

Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. *C. Fistula*, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula*, Pers. The Indian Laburnum. Vern. *Amaltás*, Hind.; *Alash*, *ali*, *karangal*, *kiár*, *kaniár*, Pb.; *Raj briksh*, *kitola*, Kumaun; *Chimkani*, Sind.; *Gurmala*, Guz.; *Sundali*, *bandarlati*, Beng.; *Sandari*, Uriya; *Kitwáli*, *kitoli*, *itola*, *shimarra*, *sím*, North-Western Provinces; *Warga*, Oudh; *Jaggarwah*, *raila*, *hirojah*, *karkacha*, C. P.; *Jaggra*, *kambar*, *rera*, Gondi; *Banag*, *bangru*, Kurku; *Bahawah*, *baya*, *bawa*, Mar.; *Raj birij*, Nep.; *Sonalu*, Gáro; *Bonurlati*, *bonurlauri*, *persar*, Palamow; *Sunaru*, Assam; *Bandolat*, Cachar; *Kone*, *sirikone*, Tam.; *Reylu*, *rela*, *suvarnam*, *konay*, Tel.; *Kaki*, Tam.; *Kakke*, Kan. *Ahalla*, Cingh.; *Gnooshway*, *gnoogyee*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{4}$  inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue. Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands.

Sub-Himalayan tract ascending to 4000 feet and throughout India and Burma. Growth moderate. 9 rings per inch of radius.

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of F
					Ft In In	
Kyd		Assam	50		2 x 1 x 1	893
Skinner No 43	1862	South India	61			846
B Thompson	1868	Central Provinces	5*			
Brand & Nos 33 and 34	1862	Burma	57 68			
Central Provinces List	1873	Central Provinces	60			
Smythies	1873	Different Provinces	60	11		

The wood is very durable but rarely of sufficiently large size for timber. It makes

two feet long. It is often cultivated for ornament.

		lbs
P 101	Sutlej Valley Punjab 3000 feet	—
P 437	Ajmere	—
P 439		61
O 211	Garhwal (1868)	52
O 343	Gorakhpur (1868)	52
C 1151	Ahira Reserve Central Provinces	56
F 579	Lolagarhi Forest, Darjeeling Terai	62
F 2352	Bamunpokri Darjeeling, Terai	62
F 783	Kamrup Assam	60
W 864	South Kanara	62
D 2052	Mysore	58
D 1076	North Arcot, Madras	73
B 2525	Burma (1862)	66

The difference between the wood of this tree and that of *Ougeinia dalbergioides* consists in this that in the former the patches of white soft tissue are continuous, forming belts, whereas in *Ougeinia* they are rhomboidal, pointed at the ends, and form interrupted belts.

2 C *marginata*, Roxb Fl Ind ii 334, Hook Fl Ind ii 262. C *Rorburghii*, DC, Beldoune t 180. Vern *Urimidi*, *uskiamen*, Tel, *Ngoozee*, Burm, *Ratoo kaa*, Singh.

A small deciduous tree, with deeply cracked, brown bark. Heartwood light brown, very hard. Pores moderate sized and large, joined by narrow, undulating, irregular, white bands of soft tissue. Medullary rays fine and very numerous, uniform and equidistant, prominent in the

A lofty deciduous tree, with thin, light-grey bark. Sapwood white; heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section. Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet; South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

E 667.	Lama Gumba Forest. Darjeeling	lbs.
D 1085.	Madura, Madras	39
		39

## 15. CASSIA, Linn.

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*C. glauca*, Lam.; Hook. Fl. Ind. ii. 265; Beddome xci.; Kurz i. 394, (*Senna arborescens*, Roxb. Fl. Ind. ii. 345) is a large shrub or small tree of the eastern part of South India and of Burma. *C. nodosa*, Ham.; Kurz i. 392. Vern. *Gnoothain*, Burm., and *C. renigera*, Wall. Vern. *Gnooshay*, Burm., are large trees of Burma, the former extending to the Eastern Himalaya.

Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

1. *C. Fistula*, Linn.; Hook. Fl. Ind. ii. 261; Roxb. Fl. Ind. ii. 333; Beddome xci.; Brandis 194; Kurz i. 391; Gamble 30. *Cathartocarpus Fistula*, Pers. The Indian Laburnum. Vern. *Amaltás*, Hind.; *Alash*, *ali*, *karangal*, *kiár*, *kaniár*, Pb.; *Raj briksh*, *kitola*, Kumaun; *Chimkani*, Sind.; *Gurmala*, Guz.; *Sundali*, *bandarlati*, Beng.; *Sandari*, Uriya; *Kitwáli*, *kitoli*, *itola*, *shimarra*, *sím*, North-Western Provinces; *Warga*, Oudh; *Jagarwah*, *raila*, *hirojah*, *karkacha*, C. P.; *Jaggra*, *kambar*, *rera*, Gondi; *Banag*, *bangru*, Kurku; *Bahawah*, *baya*, *lawá*, Mar.; *Raj birij*, Nep.; *Sonatu*, Gáro; *Bonurlati*, *bonurlauri*, *persar*, Palamow; *Sunaru*, Assam; *Bandolat*, Cachar; *Kone*, *sirikone*, Tam.; *Reybu*, *rela*, *suvarnam*, *konay*, Tel.; *Kaki*, Tam.; *Kakke*, Kan. *Ahalla*, Cingh.; *Gnooshway*, *gnoogyee*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{4}$  inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue. Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands.

It grows to 4000 feet and throughout India and Burma  
 been determined by the following  
 experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
Kyd		Assam	56		Ft In In 2 x 1 x 1	598
Skinner No 43	1862	South India	61			846
R Thompson	1869	Central Provinces	52			
Brandis, Nos 33 and 34	1862	Burma	57 58			
Central Provinces List	1873	Central Provinces	60			
Emythes	1878	Different Provinces	60	11		

The wood is very durable but rarely of sufficiently large size for timber. It makes excellent posts and is good for carts, agricultural implements and rice pounders. The pulp of the pods is a strong purgative; the bark is used in dyeing and tanning and the gum as an astringent. The wood is bright yellow, 2 feet long.

P 101	Sutlej Valley, Punjab	3000 feet	108
P 437	Ajmere		—
P 439			61
O 214	Garhwal (1868)		52
O 313	Gorakhpur (1868)		52
C 1154	Ahira Reserve	Central Provinces	56
F 579	Lohagarhi Forest	Darjeeling Terai	62
F 2352	Bamunpokri	Darjeeling Terai	62
F 783	Kamrup	Assam	60
W 861	South Kanara		62
D 2052	Mysore		58
D 1076	North Arcot	Madras	73
B 2525	Burma	(1862)	66

The difference between the wood of this tree and that of *Ougeinia dalbergioides* consists in this, that in the former the patches of white soft tissue are continuous, forming belts, whereas in *Ougeinia* they are rhomboidal, pointed at the ends, and form interrupted belts.

2 *C. marginata*, Roxb. Fl. Ind. 334, Hook. Fl. Ind. 262.  
*C. Roxburghii*, DC., Beddome. t. 180. Vern. *Urimidi*, *uskarren*, Tel.,  
*Ngoomee*, Burm., *Ratoo caa*, Singh.

A small deciduous tree, with deeply cracked, brown bark. Heartwood light brown, very hard. Pores moderate-sized and large, joined by narrow, undulating, irregular, white bands of soft tissue. Medullary rays fine and very numerous, uniform and equidistant, prominent in the

A lofty deciduous tree, with thin, light-grey bark. Sapwood white; heartwood light red, moderately hard. Pores moderate-sized to very large, often oval and divided into two to five compartments, either isolated or enclosed in narrow interrupted bands of softer tissue prominent on a vertical section. Medullary rays fine and moderately broad.

Hills of the Eastern Himalaya down to Chittagong, ascending to 4,000 feet; South India, and Burma.

Weight, 39 lbs. per cubic foot. The wood is used by planters in Darjeeling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles. It is an extremely handsome tree, growing with a fine tall cylindrical stem, handsome flowers and large bipinnate leaves, which are red when young; it reproduces easily and is fast growing. Beddome mentions a tree 27 feet in girth above the buttresses, and Manson states that a windfall tree in the Lower Darjeeling Hills had a bole 70 feet without a branch and measured 11 feet in girth at the small end.

E 667.	Lama Gumba Forest, Darjeeling	.	.	.	.	.	.	lbs.
								39
D 1085.	Madura, Madras	.	.	.	.	.	.	39

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Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

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A moderate-sized deciduous tree. Bark  $\frac{1}{2}$  inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

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Sub Himalayan tract ascending to 4000 feet and throughout India and Burma.  
Growth moderate 9 rings per inch of radius.

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
Kyd		Assam	56		Ft In In 2 x 1 x 1	588
Skinner No 43	186°	South India	61			646
R Thompson	1868	Central Provinces	6°			
Brandis, Nos 33 and 34	186°	Burma	57 66			
Central Provinces List	1873	Central Provinces	66			
Smythies	1878	Different Provinces	60	11		

The wood is very durable but rarely of sufficiently large size for timber. It makes

two feet long. It is often cultivated for ornament.

			lbs
P 101	Sutlej Valley Panjab	3000 feet	—
P 437	Ajmere		—
P 439			61
O 244	Garhwal (1868)		52
O 343	Gorakhpur (1868)		52
C 1164	Almora Reserve	Central Provinces	56
F 579	Lohagarh Forest	Darjeeling Terai	62
F 2352	Bamunpokri	Darjeeling Terai	62
F 783	Kamrup	Assam	60
W 861	South Kanara		62
D 2052	Mysore		58
D 1076	North Arcot	Madras	73
B 2523	Burma	(1862)	66

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*C. Roxburghii*, DC, Beddome t 180 Vern Urimidi, uskiamen, Tel,  
*Ngomee*, Burm, *Ratoo reaa*, Cuzh

A small deciduous tree, with deeply cracked, brown bark. Heartwood light brown, very hard. Pores moderate sized and large, joined by narrow, undulating, irregular, white bands of soft tissue. Medullary rays fine and very numerous, uniform and equidistant, prominent in the



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E 667.	Lama Gumba Forest, Darjeeling	. . . . .	lbs.
D 1085.	Madura, Madras	. . . . .	39
			39

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Heartwood hard, heavy, dark-coloured. Pores moderate-sized and large, in patches of soft texture, which in some species are confluent and form continuous concentric bands.

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A moderate-sized deciduous tree. Bark  $\frac{1}{4}$  inch thick, compact, greenish grey and smooth when young, dark-reddish brown and rough when old, exfoliating in many-sided patches. Sapwood large, heartwood varying in colour from grey or yellowish red to brick-red, very hard to extremely hard. Sharp, thin, white, concentric lines which may possibly be annual rings. Pores moderate-sized, uniformly distributed,

enclosed in, and joined by, white, wavy, irregular and often interrupted concentric bands of soft tissue. Medullary rays very fine, very numerous, uniform and equidistant, slightly bent, prominent in the dark, firm tissue which separates the wavy bands.

Tree to 4000 feet and throughout India and Burma

been determined by the following

experiments —

Experiment by whom made	Years	Wood whence produced	Weight	Number of experiments	Size of bar	Value of P
Kyd		Assam	56		Ft In In 2 x 1 x 1	888
Skinner No 43	1907	South India	61			846
R. Thompson	1868	Central Provinces	57			
Brandis Nos 33 and 34	1867	Burma	68			
Central Provinces List	1873	Central Provinces	66			
Smythies	1878	Different Provinces	60	11		

		lbs
P 101	Sutlej Valley Punjab 3000 feet	
P 437	Ajmere	
P 439		61
O 211	Garhwal (1868)	52
O 313	Gorakhpur (1868)	52
C 1151	Ahira Peserve Central Provinces	56
F 573	Lohagarhi Forest Darjeeling Terai	62
F 2352	Bamunpokri Darjeeling Terai	62
F 783	Kamruj Assam	60
W 861	South Kanara	62
D 2052	Mysore	58
D 1016	North Arcot, Madras	73
B 2525	Burma (1867)	66

The difference between the wood of this tree and that of *Ougenia dalbergioides* consists in this that in the former the patches of white soft tissue are rhomboidal.

*Ougenia* they are rhomboidal.  
Hool Fl Ind n 262  
C Roxburghii, DC, Beddome t 180 Vern Urimidi, uskiamen, Tel,  
Agomee, Burm, Ratoo waa, Cingh

A small deciduous tree, with deeply cracked, brown bark. Heartwood light brown, very hard. Pores moderate sized and large, joined by narrow, undulating, irregular, white bands of soft tissue. Medullary rays fine and very numerous, uniform and equidistant prominent in the

dark firm tissue which separates the bands of white soft tissue. Structure similar to that of *C. Fistula*.

Madras, Ceylon and Burma (Thoungyoen forests).

Weight, Skinner, No. 44, gives 63 lbs.; our specimen gives 59 lbs. per cubic foot. Skinner gives  $P=880$ . The wood is well adapted for turning, naves of wheels and handles of tools.

B 301.	Burma (1862)	lbs.
		59

3. *C. siamea*, Lamk.; Hook. Fl. Ind. ii. 264.; Kurz i. 392. *C. florida*, Vahl; Beddome t. 179. *Senna sumatrana*, Roxb. Fl. Ind. ii. 347. Vern. *Beati, manje kounne*, Tam.; *Sime tangadi*, Kan.; *Waa*, Cingh.; *Maizalee*, Burm.

A moderate-sized tree with smooth bark. Sapwood whitish, rather large. Heartwood dark brown, nearly black, very hard. Pores large and moderate-sized, joined by concentric, light-coloured, wavy bands of soft tissue which alternate with black belts of firm texture, in which the fine, light-coloured, uniform and equidistant medullary rays are prominent. Frequently beautifully mottled on a vertical section.

South India, Burma and Ceylon.

Weight, according to Skinner, No. 39, 58 lbs.; our specimens give 54.5.  $P=840$ . Very durable. Used in Burma for mallets, helms and walking-sticks; in South India it is little known, but it is considered one of the best kinds of fuel for locomotives in Ceylon (*Beddome*).

D 1080.	North Arcot	lbs.
B 2526.	Burma (1862)	58
B 2712.	Tavoy (Wallich, 1828)	54
		52

4. *C. timoriensis*, DC.; Hook. Fl. Ind. ii. 265; Beddome xcii.; Kurz i. 393. Vern. *Arremene*, Cingh.; *Toung maizalee*, Burm.

A handsome, small, evergreen tree. Wood dark brown, nearly black. Structure resembling that of *C. siamea*.

Burma and Ceylon.

Weight, 57 lbs.,  $P=594$ , according to Adrian Mendis. Used in Ceylon for building and furniture.

No. 4.	Ceylon Collection	lbs.
		57

B 2260, 45 lbs., and B 2295, 46 lbs., sent by Major Ford from the Andamans in 1866 under the name of *Gnoogyee*, belong to a species of *Cassia*. Wood hard, durable, olive brown, with a structure similar to that of *Ougeinia dalbergioides*. It is evidently a common wood in the Andamans.

## 16. BAUHINIA, Linn.

Contains about 20 to 30 species, almost equally divided into trees and climbers. Few of the species reach a very large size, but their commonness renders them important. They are easily recognised by their two leaflets being generally joined together for a portion of their length, forming apparently a bilobed, palmately veined leaf.

*Tree section.* *B. acuminata*, Linn.; Hook. Fl. Ind. ii. 276; Roxb. Fl. Ind. ii. 324; Brandis 159; Kurz i. 396. Vern. *Kanchan*, Beng.; *Kachnar*, Hind.; *Mahak-layka phyoo*, Burm., is an erect, white-flowered, handsome shrub of South India and Burma. *B. tomentosa*, Linn.; Hook. Fl. Ind. ii. 275; Roxb. Fl. Ind. ii. 323; Beddome xcii.; Brandis 159. Vern. *Kachnar*, Hind.; *Kanchini*, Tam., Tel., is a shrub or small tree of South India with showy, yellow flowers, having a purple eye, and

a tough wood with nearly black heartwood *B triandra*, Roxb. Fl Ind ii 320 is a  
 Vern Swaitan Burm  
 Burma  
 found in our forests *B*  
 Brandis 161, Kurz 1 401,  
 in the - D h. 17 1 1-2

in Northern and Central India and in Tenasserim Its uses are almost more numerous  
 than those of any other forest plant except the bamboo Its large flat leaves are sewn

in alternate veins and often with a straight  
 1)

Wood red or brown, hard, no heartwood, concentric bands of soft  
 tissue alternating with bands of finer texture, in which the numerous  
 fine, uniform and equidistant medullary rays are distinctly visible The  
 pores are uniform in size

1 *B malabarica*, Roxb Fl Ind ii 321, Hook Fl Ind ii 277,  
 Beddome xii, Brandis 159, Kurz 1 399, Gamble 31 Vern *Aml*,  
*amlosa*, Hind, *Karmai*, Beng, *Aml* *taki*, Nep, *Kattra*, Ass, *Chep-*  
*pura*, *Basarana pada*, Kan, *Aml*, Mar, *Kundapula*, *dhondel*, *langali*,  
*Gondi*, *Ambotha*, *chapa*, Kurku, *Palla dondur*, *puli shinta*, *pulhari*, Tel,  
*Apta*, Berar, *Brayggyn*, Burm

A moderate sized deciduous tree Bark  $\frac{1}{2}$  inch thick, rough, brown,  
 exfoliating in linear flakes Wood light-reddish brown, with irregular  
 masses of black or purplish wood near the centre, moderately hard  
 Pores moderate sized, generally oval and subdivided Numerous narrow,  
 wavy, white, concentric bands of softer tissue alternate with bands of  
 harder and red coloured wood of equal width, in which the numerous,  
 fine, uniform and equidistant medullary rays are distinctly visible

Sib-Himalayan tract from the Ganges to Assam Bengal Burma South India  
 Weight the average of our specimens gives 48 lbs, Brandis 1862 Burma L et  
 No 31, 12 lbs The wood is rarely used The tree is recognised by its acid leaves  
 which are eaten

	lbs
C 1137 Aluri Reserve Central Provinces	
C 1817 Melhat Berar (any wood)	44
C 821 Burigarth Reserve Berar	47
F 590 Klooklong Forest Darjeeling Terai	51
F 230 Ramunpokri Darjeeling Terai	18
B 3203 Burma (1862)	

2 *B racemosa*, Lam, Hook Fl Ind ii 276, Beddome t 182,  
 Brandis 159, Kurz 1 397 *B parviflora*, Vahl, Roxb Fl Ind ii 323  
 Vern *Kosundra*, *taur*, Pb, *Kachnal*, *gural*, *thaur*, *ashla* *malikina*,  
*rauli*, *dherari*, Hind, *Dhendra*, *dhun lera*, *astra*, *tsika*, Gondi; *Jhinyi*,

Ajmere; *Ari*, arro, Tel.; *Ati*, *archi*, *areka*, Tam.; *Apta*, *seyára*, Mar.; *Banraj*, Beng.; *Ambhota*, Uriya; *Aupta*, Kan.; *Hpalun*, Burm.; *Amba* *dhósa*, Bhíl; *Bossai*, Kurku.

A small deciduous tree. Bark  $\frac{1}{4}$  inch thick, dark brown, very rough, with numerous, deep, vertical cracks. Wood light brown, hard, with irregularly-shaped masses of darker-coloured and harder wood near the centre. Pores moderate-sized, often in radial lines. Narrow, white, irregular bands of softer tissue alternate with darker bands of somewhat greater width, in which the very numerous, fine, uniform and equidistant medullary rays are distinctly visible.

Sub-Himalayan tract from the Ravi eastwards, ascending to 5,000 feet; Oudh, Bengal, Burma, Central and South India.

Weight, Brandis' Burma List, 1862, No. 32, gives 44 lbs.; R. Thompson, 56 lbs.; our specimens give 50 lbs. on an average. The wood is good, but not used. The fibres of the bark are used to make ropes and slow matches.

P 453.	Ajmere	. . . . .	lbs.
P 3216.	Nagpahar, Ajmere	. . . . .	...
O 247.	Garhwal (1868)	. . . . .	53
O 335.	Gorakhpur (1868)	. . . . .	47
C 200.	Mandla, Central Provinces (1869)	. . . . .	56
C 1170.	Ahiri Reserve, Central Provinces	. . . . .	44
C 2770.	Melghát, Berar (sapwood)	. . . . .	41

**3. *B. purpurea***, Linn.; Hook. Fl. Ind. ii. 284; Roxb. Fl. Ind. ii. 320; Beddome xcii.; Brandis 160; Kurz i. 398; Gamble 31. Vern. *Koiral*, *karár*, *karalli*, *gray*, Pb.; *Koliár*, *kaniár*, *kandan*, *khairwal*, *kwillar*, *koilari*, *sona*, Hind.; *Khwairalo*, Nep.; *Kachik*, Lepcha; *Deva kanchan*, *rakta kancha*, *koiral*, Beng.; *Kodwari*, Gondi; *Koliari*, Kurku; *Atmatti*, Mar.; *Kanchan*, Tel.; *Pedda aré*, *mandareh*, Tam.; *Sarú*, *kanchivála*, Kan.; *Mahalay kani*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{3}$  to  $\frac{1}{2}$  inch thick, ash-coloured to dark brown. Wood pinkish white, turning dark brown on exposure, moderately hard. Pores moderate-sized, mostly oval, subdivided. Wavy, concentric bands of soft tissue alternating with darker-coloured bands of firmer tissue, in which the white, fine, uniform and equidistant medullary rays are distinctly visible.

Sub-Himalayan tract from the Indus eastward, Central and South India and Burma.

Weight, according to Skinner, No. 24, 39 lbs.; our specimens give an average of 49 lbs. Wood used for agricultural implements and in construction. The bark is used for tanning, the leaves for cattle fodder, and the flower buds are pickled and eaten.

									lbs.
P	153.	Sainj, Gori Valley, 3,000 feet	.	.	.	.	.	.	42
O	229.	Garhwal (1868)	.	.	.	.	.	.	55
O	230.	" "	.	.	.	.	.	.	46
C	822.	Bairagarh Reserve, Berar	.	.	.	.	.	.	50
C	2792.	Melghât, Berar (sapwood)	.	.	.	.	.	.	36
E	585.	Khooklong Forest, Darjeeling Terai	.	.	.	.	.	.	50

4. *B. variegata*, Linn.; Hook. Fl. Ind. 284; Roxb. Fl. Ind. ii. 319; Beddome xcii.; Brandis 160; Kurz i. 397; Gamble 31. Vern. *Kachnar*, *koliár*, *kurál*, *padrián*, *khwairál*, *guriál*, *gwiár*, *bariál*, Hind.; *Taki*, Nep.; *Rha*, Lepcha; *Rakta kanchan*, Beng.; *Borara*, Uriya; *Segapu-munthari*, Tam.; *Kanchivala-do*, Kan.; *Bwaycheng*, Burm.

A moderate sized deciduous tree Bark grey, with vertical cracks Wood grey, moderately hard, with irregular masses of darker and harder wood in the centre Pores moderate sized, enclosed in round or elongated and pointed concentric patches of white soft tissue, which often run into each other The intervening tissue is firm and dark coloured, with very numerous, fine, uniform and equidistant white medullary rays Distinct white, concentric lines, which probably are annual rings Medullary rays distinctly visible on a radial section, giving the wood a handsome mottled appearance

Sub Himalayan tract from the Indus eastwards and throughout the forests of India and Burma Often planted for ornament

Weight according to R Thompson 54 lbs our specimen gives 42 lbs Used for agricultural implements The bark is used for dyeing and tanning and the leaves and flower buds eaten The flowers are very handsome somewhat like those of some of the *Azaleas* but having four white and one crimson petal

P 1200	Madhopur Punjab	lbs
C 823	Buragarh Reserve Berar	33
E 591	Khoklong Forest Darjeeling Terai	48
E 2351	Bamunpokri	47
		39

5 *B. retusa*, Ham, Hook Fl Ind n 279, Roxb Fl Ind n 322, Beddome xcm, Brandis 161 Vern *Aural*, Pb, *Kandla*, *Kanalla*, *Kuayral*, *gwayral*, *Kanlao*, *semia*, Hind, *Nirpa* Gondi, Tel, *Tewar*, Pulamow

A moderate sized deciduous tree Bark  $\frac{1}{2}$  inch thick, dark brown, with a few vertical cracks Wood reddish white, with irregularly shaped, darker masses near the centre, hard Pores moderate sized and large, scanty, occasionally grouped Numerous narrow, white, concentric bands of softer tissue, alternating with harder and darker bands of equal width in which the white, fine, uniform equidistant and very numerous medullary rays are prominent

North West Himalaya from the Beas eastwards, ascending to 4,500 feet, Central India

Weight 58 lbs per cubic foot Wood not used It gives a clear gum called Semla Gum almost exactly resembling gum arabic it is largely collected and exported from the Delhi Dun Of this gum Capt Campbell says —

The collection of the Semla gum commences in January and is continued throughout February and March It sells in Dehra at Re 1 8 Rs 2 or Rs 2 8 per maund according to quality and is utilised as a medicine and in compound with other medicines Occasionally too it is eaten in its crude state by the very poorest natives down country It is also used to waterproof terraced roofs The annual export from the Delhi Dun is about 2 500 maunds

O 532	Delhi Dun	lbs
C 1160	Abiri Reserve Central Provinces	58

## 17 ALZELIA, Sm

Contains 2 trees *A. retusa* Kurz is a small evergreen tree of the coast forests of the Andamans The *Maraboe* wood of Malacca is probably *A. palembanica* Baker

1 *A. bijuga*, A Gray, Hook Fl Ind n 274, Kurz 412 Vern *Skoondul*, *Kinga*, Beng, *Pynkado*, Barm in the Andamans, *Piryds*, *dagundi*, And

A moderate sized evergreen tree Bark thin, grey, peeling off in fine, papery scrolls Sapwood white, moderately hard, large in young trees, small in old trees, heartwood reddish brown, hard,

Pores moderate-sized, frequently oval and subdivided, enclosed in oval patches of soft tissue, prominent on a longitudinal section. Medullary rays fine, numerous, uniform and equidistant, wavy, visible on a radial section as long narrow bands.

Sundarbans of Bengal, Andaman Islands and the Malay Archipelago. It will probably be found on the coasts of Arracan, Pegu and Tenasserim.

Weight, young wood 36 to 42 lbs.; old wood 45 to 49 lbs. Brandis' Memorandum on Andaman woods, 1874, Nos. 12, 13, gives 50 lbs. A valuable wood, used in the Andamans for bridge and house building.

E 403.	Sundarbans	.	.	.	.	.	.	.	lbs.
E 415.	"	.	.	.	.	.	.	.	36
B 315.	Burma (1867) ( <i>Kohbeng</i> )	.	.	.	.	.	.	.	42
B 521.	Andaman Islands	.	.	.	.	.	.	.	49
B 2209.	"	.	.	.	.	.	.	.	45
	"	.	.	.	.	.	.	.	48

### 18. TAMARINDUS, Linn.

1. *T. indica*, Linn.; Hook. Fl. Ind. ii. 273; Roxb. Fl. Ind. iii. 215; Beddome t. 184; Brandis 163; Kurz i. 414; Gamble 32. The Tamarind. Vern. *Ambli*, *ambli*, *imli*, Hind.; *Tintiri*, *tintil*, *tintál*, Beng.; *Titri*, Nep.; *Teteli* Ass.; *Tentúli*, *koyam*, Uriya; *Páli*, Tam.; *Chinta*, Tel.; *Sitta*, *hitta*, Gondi; *Chicha*, Kurku; *Karangi*, *kamal*, *asam*, Mysore; *Hunase*, Kan.; *Ambli*, *chitz*, Mar.; *Siyembela*, Cingh.; *Magyee*, Burm.

A large evergreen tree. Bark  $\frac{1}{2}$  inch thick, dark grey, with longitudinal fissures and horizontal cracks. Wood yellowish white, sometimes with red streaks, hard and close-grained. Heartwood small, near the centre of old trees only, dark purplish brown, with an irregular outline and radiating ramifications, very durable. Annual rings indistinct. Pores moderate-sized, uniformly distributed, each pore or group of pores surrounded by round patches of soft tissue, which are often confluent, forming irregular and oblique bands. Medullary rays very fine, very numerous, uniform and equidistant.

Cultivated throughout India and Burma as far north as the Jhelum.

The weight and transverse strength have been ascertained by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	No. of experiments.	Size of bar.	Value of P.
Puckle . . . . .	.....	Mysore . . .	83	4	Ft. In. In. 2 × 1 × 1	792
Skinner, No. 121 . . .	1862	South India . .	79	.....	.....	864
Cunningham . . . . .	.....	Gwalior . . .	60	2	2 × 1 × 1	614, sapwood.
" . . . . .	.....	" . . .	79	2	2 × 1 × 1	815, heartwood.
Adrian Mendis, No. 79 .	1855	Ceylon . . .	80	.....	2 × 1 × 1	780
Smythies . . . . .	1878	Mysore . . .	82	1	.....	heartwood,
		Other Provinces . .	62	2	.....	sapwood.

Wood highly prized, though extremely difficult to work. It is used for wheels, mallets, planes, furniture, rice-pounders, oil and sugar mills, and is an excellent wood for turning. The fruit is used in medicine as a laxative; it is made into preserves and exported to Europe. The leaves are also used in curries, and the seed, ground to powder and mixed with gum, gives a strong cement.

It is very largely planted in avenues and topes and is one of the most beautiful of Indian trees

			lbs
C 2811	Melghat Berar	} sapwood {	61
P 451	Ajmere		63
E 2353	Siliguri Bengal		63
D 2014	Mysore	} heartwood {	82
No 79	Ceylon Collection		80

## 19 HARDWICKIA, Roxb

Contains 2 species both from Central and South India

Heartwood dark coloured, hard, heavy Pores moderate sized, filled with resin Medullary rays fine, very numerous, the distance between the rays being less than the transverse diameter of the pores

1 *H binata*, Roxb Fl Ind ii 423, Hook Fl Ind ii 270, Beddome t 26, Brandis 162 Vern *Anjan* Hind, Mar, *Acha*, *alti*, Tam, *Nar yepi*, *yapa*, Tel, *Kamra*, *karachi*, Kan, *Chhota dundheia*, Gondi, *Bone* Kulu, *Parsul*, Singiowli

A deciduous tree Bark  $\frac{1}{2}$  inch thick, dark grey, rough with irregular vertical cracks, exfoliates in narrow flakes Sapwood small, white, heartwood extremely hard, dark red, often with a purplish tinge, cross and very close grained Pores moderate sized often subdivided, filled with resin, uniformly distributed Medullary rays fine, numerous, undulating, and frequently lent where they touch the pores, visible on a radial section as straight, narrow, white bands Scanty, fine, concentric lines

In dry forests of South and Central India  
grows in isolated belts or patches of

		lbs
C 800	Punassa Perce Central Provinces	84
C 1147	Aluri	84
C 2986	Nimar Central Provinces	83
C 2929	Palamow Bengal	82
D 1055	Sal in Madras	83
D 2025	Mysore	77
No 31	Salem Collection	82

2 *H pinnata*, Roxb Fl Ind ii 425, Hook Fl Ind ii 270, Beddome t 255 Vern *Kolarn*, Tinnevely, *Mitayen sampran*, Travancore, *Ienne*, Manjarabad (*VanSomeren*)

A very large tree Sapwood large, heartwood brown, moderately hard, exuding a red, sticky substance similar to copala balsam, which consists of different resins dissolved in an essential oil Pores moderate



sized and large, often subdivided. Medullary rays fine, nearly equidistant, bending where they touch the pores. Scanty, not very prominent, concentric lines of soft texture.

Western Ghâts from South Kanara to Travancore.

Weight, 47 lbs. per cubic foot. Wood used for building by coffee planters and others. For analysis of the gum resin see Mr. Broughton's Report in *Beddome Fl. Sylv. Madr. t. 255*.

D. 1064. Tinnevely . . . . . lbs.  
47

## 20. CYNOMETRA, Linn.

Contains 4 Indian species. *C. cauliflora*, Linn.; Hook. Fl. Ind. ii. 268; *Beddome t. 315*, is an evergreen tree cultivated in Burma and South India; *C. travancorica*, *Beddome t. 316*; Hook. Fl. Ind. ii. 267, is a lofty tree of the hills of Travancore and Tinnevely, between 2,000 and 4,000 feet.

Wood red, hard, heavy; no heartwood. Numerous, narrow, concentric bands similar to those of *Bauhinia*.

1. *C. ramiflora*, Linn.; Hook. Fl. Ind. ii. 267; *Beddome t. 315*; *Kurz i. 415*. *C. bijuga*, Spanoghe. Vern. *Shingr*, Beng.; *Irapú*, Tam.; *Myeng kabeng*, Burm.; *Gal mendora*, Cingh.

A large evergreen tree. Wood red, hard, close-grained. Pores small, uniformly distributed, often oval and subdivided. Numerous wavy bands of soft, light-coloured tissue, alternating with narrower bands of hard and firmer tissue, in which the fine and very numerous medullary rays are distinctly visible.

Sundarbans, South India and Burma in tidal forests.

Weight, 56 lbs.; P = 826, Skinner, No. 52; our specimens give 58 lbs. per cubic foot; Nos. 27, 32, of Adrian Mendis' Ceylon Collection bear the names *Gal mendora* and *Hal mendora*, weight, 56 to 58 lbs.; P = 740. Skinner says that it is used for house-building and carts, and that chips of the wood give in water a purple dye. It is used in the Sundarbans for posts for native huts and for fuel.

E 397. Sundarbans . . . . . lbs.  
58

2. *C. polyandra*, Roxb. Fl. Ind. ii. 372; Hook. Fl. Ind. ii. 268. Vern. *Ping*, Cachar, Sylhet.

A large evergreen tree. Wood light red, hard, close-grained. Pores moderate-sized, joined by narrow concentric bands of soft tissue. Medullary rays moderately broad.

Khasia Hills, Sylhet and Cachar.

Weight, 53 lbs. according to Wallich; our specimens give 60 lbs. Mann says the wood is very useful for scantlings and makes good charcoal.

E 1276. Cachar . . . . . lbs.  
60

## 21. SARACA, Linn.

Three Indian species are given in the *Flora Indica*. *S. Lobbiana*, Baker; Hook. Fl. Ind. ii. 272, is a tree of Martaban; and *S. triandra*, Baker; Hook. Fl. Ind. ii. 272 (*Jonesia triandra*, Roxb. Fl. Ind. ii. 220) of Tenasserim.

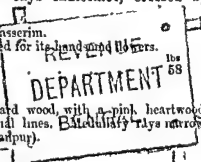
1. *S. indica*, Linn.; Hook. Fl. Ind. ii. 271; *Beddome t. 57*; *Brandis 166*; *Kurz ii. 415*. *Jonesia Asoca*, Roxb. Fl. Ind. ii. 218. Vern. *Asok*, Hind.; *Asoka*, Beng.; *Aseka*, *ati*, Cuttack; *Diyera tembela*, Cingh.; *Ashunkar*, Kan.; *Jassundi*, Bombay; *Thaw-ka-hpo*, Burm.

Wood light, reddish-brown, soft. Pores moderate-sized in radial and frequently oblique lines. Medullary rays indistinct, crossed by numerous, fine, wavy, concentric lines.

Eastern Bengal, South India, Arracan and Tenasserim.

Weight, 50 lbs. per cubic foot. Often cultivated for its hard wood.

No 23 Ceylon Collection



The Carob tree, *Ceratonia siliqua*, has a hard wood, with a pink heartwood. Pores moderately small, often in groups or radial lines. Medullary rays narrow, unequal, irregularly distributed (No. 3266. Saharanpur).

### Sub Order III. MIMOSÆ

Contains 13 Genera divided into 5 Tribes, viz. —

Tribe I.—Parkiæ		<i>Parkia</i> .
" II.—Adenantheræ		<i>Entada, Piptadenia, Adenanthera, Prosopis</i> and <i>Dichrostachys</i> .
" III.—Eumimosæ		<i>Mimosa, Leucana</i> and <i>Alyia</i> .
" IV.—Acaciæ		<i>Acacia</i> .
" V.—Ingeæ		<i>Calliandra, Albizzia</i> and <i>Pithecolobium</i> .

*Parkia* contains 3 species from Eastern Bengal and Burma: *P. Roxburghii*, *P. indica*, *P. latifolia*.

*scandens*, Bth.; Hook.  
*rsatha*, DC., *Mimosa*  
*redi*, Uriya; *Pangra*,  
*av.* Burm. is a large

containing  
 Children  
 The kernels  
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tree found  
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 ls, Eastern  
*P. dulce*,  
 is, Willd.;  
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 introduced  
 dish brown  
 it coppies  
 Hook. Fl.  
 Hind. is a

large tree of the forests of the outer

## 22. PIPTADENIA, Benth.

1. *P. oudhensis*, Brandis 168; Hook. Fl. Ind. ii. 289. *Adenanthera oudhensis*, J. L. Stewart. Vern. *Gainti*, Oudh.

A moderate-sized tree. Bark  $\frac{1}{2}$  inch thick, grey-brown to dusky red, rough with flattish, exfoliating woody scales; inner bark red, fibrous. Wood yellowish or reddish, close-grained, no heartwood, hard, durable. Pores moderate-sized and large, often subdivided in patches of soft tissue, which are sometimes confluent. Medullary rays short, numerous, moderately broad.

Forests at the foot of the Nepal Hills, Gonda division, Oudh, discovered by Mr. R. Thompson.

O 3084. Gonda, Oudh.

## 23. ADENANTHERA, Linn.

1. *A. pavonina*, Linn.; Hook. Fl. Ind. ii. 287; Roxb. Fl. Ind. ii. 370; Beddome t. 96; Brandis 168; Kurz i. 417. Vern. *Rakta-chandan*, *ranjana*, Beng.; *Ani kundamani*, Tam.; *Bandi gurivenda*, Tel.; *Manjati*, Mal.; *Thorlaganj*, Mar.; *Manjádi*, Kan. *Madateya*, Cingh.; *Gung*, Magh; *Ywaygyee*, Burm.; *Rechedá*, And.

A deciduous tree, with grey bark. Heartwood red, hard, close-grained. Pores small, scanty, in short radial lines. Medullary rays very fine, extremely numerous.

Bengal, South India, Burma and Andaman Islands.

Weight, Skinner, No. 12, gives 56 lbs., which is the same as our specimen; Bennett gives 55 lbs. Skinner gives P = 863; and Bennett 942. The wood is used in South India for house-building and cabinet-making purposes, and gives a red dye. The seeds are worn as ornaments, and are used as beads by goldsmiths and jewellers as they are said to be very constant in weight, viz., 4 grains; they give an oil.

B 523. Andaman Islands

## 24. PROSOPIS, Linn.

Contains about 18 species, dispersed over the tropical and sub-tropical regions of Asia, Africa and America. Of the five sections which compose the genus, sections whose characters are based to some extent upon the shape and structure of the fruit, three may be noticed, as they contain species which have lately been introduced into India:—

- |  |               |
|--|---------------|
| 1. With the pod smooth or slightly thickened at the seeds  | } Adenopsis   |
| 2. With the pod smooth, thickened at the seeds so as to be almost jointed, and generally falcate |               |
| 3. With the pod spirally twisted   | } Strobocarpa |

Contains the two Indian species; *P. spicigera*, the well-known "Jhand" and *P. Stephaniana* of the Northern Punjab plains and Western Asia.

Contains two of the species now being grown, viz., *P. glandulosa* of the mountains of Western Texas; and *P. pallida* of South America.

Contains the true "Mesquit" Bean, or *P. pubescens* of Texas and New Mexico.

*P. spicigera*, Linn., is here described; *P. Stephaniana*, Kunth; Hook. Fl. Ind. ii. 288; Brandis 171. Vern. *Jembút*, Arab., is a small thorny shrub of no economic use. *P. pallida*, Kunth, is a native of South America, and has been successfully introduced. Its pods are considered of high value as a tanning material, con-

taining, it is said, as much as 90 per cent of tannic acid. They are known by the name of "Balsamocarpon."

"I am Alvarado of Texas," is a native of the

It is believed, also, a very hard and durable timber, with a beautiful grain, and is used for building and in the manufacture of charcoal. It also affords a large quantity of gum resembling gum arabic, which exudes from the stem and branches, and has been used as mucilage in the making of pyribes, and for other purposes.

*P. pubescens*, Bth, the "Screw Bean" or "Screw Mesquit," is a small tree of Texas, New Mexico and Arizona. Remarkable for its screw shaped pods. These pods grow in abundant clusters of 8 or 10 upon the same stem, ripen at all times of the year, and contain much nutritious saccharine matter, but great caution is required in their use as fodder for horses.

Another species, a native of Jamaica, and possibly not distinct from *P. glandulosa*, is the *P. juliflora*, DC, of the section *Algarobia*. Its fruits have poisonous properties, though, for other purposes, the tree appears to be useful for planting in some localities, as the plants when once established go on sending up shoot after shoot, and are difficult to eradicate.

1. *P. spicigera*, Linn.; Hook. Fl. Ind. ii 288; Beddome t. 56; Brandis 169. *Adenanthera aculeata*, Roxb. Fl. Ind. ii. 371. Vern. *Jhand*, *khār*, Pb.; *Kandi*, *kundi*, Sind., *Channlra*, Agra; *Khejra*, Rajputana; *Sangri*, Pertabgarh; *Semru*, *hamra*, Guz; *Skemi*, *saunder*, Mar.; *Shami*, Beng., *Uriya*; *Perumbe*, *vunne*, *jambu*, Tam.; *Chani*, Tel.

A moderate-sized, deciduous, thorny tree. Bark  $\frac{3}{4}$  to 1 inch thick, grey, rough, with deep longitudinal fissures and horizontal cracks. Sapwood large, perishable, heartwood purplish brown, extremely hard. Pores very small to moderate-sized, generally imbedded in narrow irregular concentric bands of soft tissue, filled with resin. Medullary rays short, extremely numerous, fine, wavy.

And, northern and southern dry zones. Punjab, Sindh, Rajputana, Guzerat, Bundelkhand and Dekkan

Brandis says the growth is probably slow, it having 3 feet girth in 30 years (Siharimpur), this would give about 6 years per inch of radius, which is moderately fast.

Weight, according to Skinner, No 109, 72 lbs, but the identification of his  
 Dalzell gives 58 lbs., and J. L. Stewart 51 lbs, our specimens  
 durable, liable to  
 oppices well  
 elements, but  
 dis gives the  
 s wood were  
 the pressure  
 tratica wood

1,398 ll., and of *Tamarix gallica* wood 1,300 ll. The same test  
It is largely used for fuel for locomotives and steamers in the Punjab and Sind, and

The pods are used as fodder for camels,  
 instance is eaten, raw or cooked, in parts of  
 has the flavour of that of the Carob tree.  
 of which pieces were sent to the

It has an  
Paris 121  
61 feet.

P 882	Multán . . . . .	91
P 979	" (rootwood) . . . . .	97
P 1380	Karokpo Forest, Hyderabad, Sind . . . . .	79
P 159	Ajmere (young tree) . . . . .	87

25. *DICHROSTACHYS*, DC.

1. *D. cinerea*, W. and A. ; Hook. Fl. Ind. ii. 288 ; Beddome t. 185 ; Brandis 171. *Mimosa cinerea*, Roxb. Fl. Ind. ii. 561. Vern. *Vurtuli*, Hind. ; *Kunlai*, *kunrat*, *kheri*, Mhairwarrâ ; *Vadatalla*, *vadatarâ*, Tam. ; *Pelluru*, *yellu*, Tel. ; *Segum kati*, Mar., Gondi ; *Andara*, Cingh.

A thorny shrub or small tree. Heartwood red, extremely hard. Pores moderate-sized, enclosed in rings of soft texture. Medullary rays short, moderately broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Dry, stony hills in South and Central India, Rajputana.

Weight, 75 lbs. per cubic foot. Wood used for walking-sticks.

No.	25.	Salem Collection.	.	.	.	.	.	.	lbs.
No.	3.	Ceylon Collection (marked <i>Vachellia farnesiana</i> )	.	.	.	.	.	.	79
P	3239.	Ajmere	.	.	.	.	.	.	71
P	3229.	Nagpahar, Ajmere	.	.	.	.	.	.	...

26. *MIMOSA*, Linn.

*M. pudica*, Linn. ; Hook. Fl. Ind. ii. 291. The Sensitive Plant. Vern. *Lajwanti* Kumaun ; *Lajuk*, Beng., is now naturalised over the greater part of tropical and sub-tropical India, where it grows to be a small shrub, and is with difficulty eradicated. *M. hamata*, Willd. ; Hook. Fl. Ind. ii. 291, is a prickly shrub of South India.

1. *M. rubicaulis*, Linn. ; Hook. Fl. Ind. ii. 291 ; Brandis 172 ; Gamble 32. *M. mutabilis*, Roxb. Fl. Ind. ii. 564. Vern. *Râl*, *khair*, *didriâr*, Pb. ; *Hajeru*, Sind ; *Agla*, *agl*, *kingli*, *kacheyta*, Hind. ; *Aradi*, Nep. ; *Sibriû*, Lepcha ; *Chilatti*, Bhîl.

A large, straggling, prickly shrub with grey bark. Sapwood yellowish white ; heartwood red, hard. Pores small and moderate-sized, frequently oval and subdivided. Medullary rays fine and very numerous.

Throughout the greater part of India, ascending to 4,000 feet in Kumaun and Sikkim.

Weight, 41 to 52 lbs. Used for gunpowder charcoal.

E	680.	Bamunpokri, Darjeeling Terai	.	.	.	.	.	.	lbs.
E	2354.	Chunbati, Darjeeling, 2,000 feet	.	.	.	.	.	.	41
									52

27. *XYLIA*, Bth.

1. *X. dolabriformis*, Benth. ; Hook. Fl. Ind. ii. 286 ; Beddome, t. 186 ; Brandis 171 ; Kurz i. 419. *Mimosa xylocarpa*, Roxb. Fl. Ind. ii. 543. *Inga xylocarpa*, DC. The Ironwood Tree of Pegu and Arracan. Vern. *Jambu*, Hind. ; *Jamba*, *suria*, Mar. ; *Boja*, Uriya ; *Irûl*, Tam. ; *Konda tangedu*, *tangedu*, *eruvadu*, *bojeh*, Tel. ; *Jambé*, *tirawa*, Kan. ; *Shilve*, Coorg ; *Pynkado*, Burm.

A large deciduous tree. Bark  $\frac{1}{4}$  inch thick, grey or reddish brown, with short cracks irregularly distributed. Sapwood small ; heartwood dark brown or reddish brown, extremely hard, beautifully mottled, cross-grained, the fibres on a longitudinal section being wavy. Annual rings indistinct, but alternate concentric bands of darker and lighter colour. Pores small and moderate-sized, often subdivided into numerous compartments, and then oval or oblong. Pores or groups of pores in irregular patches of whitish tissue, which are often arranged in zig-zag lines. These patches are separated by hard, dark-coloured tissue in which the

very fine and very numerous medullary rays are distinctly visible. Some of the specimens of this wood have an oily touch.

Chanda District, South India, Arracan and Burma

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured	Weight	No of experiments	Size of bar	Value of $\frac{P}{A}$
Puckle . . .	1859	Mysore . . .	55		Fl in in 2 x 1 x 1	603
List of woods . . .	1863	" . . .	59			
Brandis, No 37 . . .	1862	Burma . . .	40-66			
Commissariat Department		Moulmein	67			1153
Skinner, No 83 . . .	1862	South India . . .	59			635
H naon		Burma	83		3 x 14 x 14	1191
Laslett . . .	1875	" . . .	73.5	8	7 x 2 x 2	905
Smythies . . .	1878	Chanda	59	1		
	"	Kanara	61	4		
	"	Burma	65	3		

The wood is very durable—a property it doubtless owes in great measure to the resinous substance contained in it. This resin is more abundant in Burmese wood than in Indian. It is soluble in alcohol, ether, and benzene, and is volatile in steam, and is oxidized by the action of air, and is soluble in hot water.

Burma; also for carts and tool handles. In South India it is used for railway sleepers, posts, boat-building and carts. In Burma and Bengal it has been largely used for telegraph posts, for which it has answered well. The large forests in Arracan, of which Dr Seebach in his report on the ironwood forests of Arracan, dated 1st September 1869, says that "a third of the forest vegetation consists of *Pynkado*, produce large numbers of telegraph poles and railway sleepers. Major Serton in his report for 1876-77 said that 10,000 such sleepers from Arracan had then lately been sold at Calcutta at Rs 5 each, and Mr Ribbentrop's Report states

C 1151	Ahira Reserve, Central Provinces . . .	59
W 751	South Kanara . . .	59
W 761.	" . . .	61
W 857.	" . . .	61
W 1229	North Kanara . . .	62
B 805.	Tharrawalli, Burma . . .	67
B 2068	Burma (1862) . . .	66
B 1151	Taroy (Wallach, 1828) . . .	62

## 28. ACACIA, Willd.

Contains about 15 Indian species, of which four are climbing or straggling thorny shrubs, and the rest trees or erect shrubs. *A. Latronum*, Willd., Hook Fl Ind n 206. Bell time tree, Brandis 180 (*Mimosa Latronum*, Roxb Fl Ind n 150). Very like *Albizia*. *Pithecellobium* Tel. is a common very thorny plant of the

25. *DICHIROSTACHYS*, DC.

1. *D. cinerea*, W. and A. ; Hook. Fl. Ind. ii. 288 ; Beddome t. 185 ; Brandis 171. *Mimosa cinerea*, Roxb. Fl. Ind. ii. 561. Vern. *Vartuli*, Hind. ; *Kantai*, *kunrat*, *kheri*, Mhairwarra ; *Vadatalla*, *vadatarā*, Tam. ; *Feltarn*, *yellu*, Tel. ; *Segum kati*, Mar., Gondi ; *Andara*, Cingh.

A thorny shrub or small tree. Heartwood red, extremely hard. Pores moderate-sized, enclosed in rings of soft texture. Medullary rays short, moderately broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Dry, stony hills in South and Central India, Rajputana.

Weight, 75 lbs. per cubic foot. Wood used for walking-sticks.

No.	25.	Salem Collection.						lbs.
No.	3.	Ceylon Collection (marked <i>Tachellia farnesiana</i> )	.	.	.	.	.	79
P	3239.	Ajmere	.	.	.	.	.	71
P	3229.	Nagpahar, Ajmere	.	.	.	.	.	...

26. *MIMOSA*, Linn.

*M. pudica*, Linn. ; Hook. Fl. Ind. ii. 291. The Sensitive Plant. Vern. *Lajwanti* Kumaun ; *Lajuk*, Beng., is now naturalised over the greater part of tropical and sub-tropical India, where it grows to be a small shrub, and is with difficulty eradicated. *M. hamata*, Willd. ; Hook. Fl. Ind. ii. 291, is a prickly shrub of South India.

1. *M. rubicaulis*, Linn. ; Hook. Fl. Ind. ii. 291 ; Brandis 172 ; Gamble 32. *M. mutabilis*, Roxb. Fl. Ind. ii. 564. Vern. *Rāl*, *khair*, *didriār*, Pb. ; *Hajeru*, Sind ; *Aglā*, *agl*, *kingli*, *kacheyta*, Hind. ; *Aradi*, Nep. ; *Sibriū*, Lepcha ; *Chilatti*, Bhil.

A large, straggling, prickly shrub with grey bark. Sapwood yellowish white ; heartwood red, hard. Pores small and moderate-sized, frequently oval and subdivided. Medullary rays fine and very numerous.

Throughout the greater part of India, ascending to 4,000 feet in Kumaun and Sikkim.

Weight, 41 to 52 lbs. Used for gunpowder charcoal.

E	680.	Bamunpokri, Darjeeling Terai	.	.	.	.	.	lbs.
E	2354.	Chunbati, Darjeeling, 2,000 feet	.	.	.	.	.	41
			.	.	.	.	.	52

27. *XYLIA*, Bth.

1. *X. dolabriformis*, Benth. ; Hook. Fl. Ind. ii. 286 ; Beddome, t. 136 ; Brandis 171 ; Kurz i. 419. *Mimosa xylocarpa*, Roxb. Fl. Ind. ii. 543. *Inga xylocarpa*, DC. The Ironwood Tree of Pegu and Arracan. Vern. *Jambu*, Hind. ; *Jamba*, *suria*, Mar. ; *Boja*, Uriya ; *Irāl*, Tam. ; *Konda tangedu*, *tangedu*, *eruvalu*, *bojeh*, Tel. ; *Jambé*, *tirawa*, Kan. ; *Shilve*, Coorg ; *Pynkado*, Burm.

A large deciduous tree. Bark  $\frac{1}{4}$  inch thick, grey or reddish brown, with short cracks irregularly distributed. Sapwood small ; heartwood dark brown or reddish brown, extremely hard, beautifully mottled, cross-grained, the fibres on a longitudinal section being wavy. Annual rings indistinct, but alternate concentric bands of darker and lighter colour. Pores small and moderate-sized, often subdivided into numerous compartments, and then oval or oblong. Pores or groups of pores in irregular patches of whitish tissue, which are often arranged in zig-zag lines. These patches are separated by hard, dark-coloured tissue in which the

very fine and very numerous medullary rays are distinctly visible. Some of the specimens of this wood have an oily touch.

Chanda District, South India, Arracan and Burma

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured	Weight	No of experiments.	Size of bar	Value of $\frac{W}{L^2}$
					Ft in in	
Puckle . . . . .	1830	Mysore . . . . .	59		2 x 1 x 1	693
List of woods . . . . .	1863	" . . . . .	59		"	
Brandis, No 37 . . . . .	1862	Burma . . . . .	60-60			
Commissariat Department		Moulmein	63			1183
Skinner, No 83 . . . . .	1862	South India . . . . .	59			830
Henson		Burma . . . . .	83		3 x 14 x 14	1191
Laslett . . . . .	1875	" . . . . .	73.5	6	7 x 2 x 2	953
Smythies. . . . .	1878	Chanda	59	1		
	"	Kanara . . . . .	61	4		
	"	Burma . . . . .	62	3		

The wood is very durable—a property it doubtless owes in great measure to the resinous substance contained in it. This resin is more abundant in Burmese wood than in the Indian. Wallich

tests, and  
e in hot

Burma; in posts, boat-building and carts. In Burma and Bengal it has been largely used for telegraph posts, for which it has answered well. The large forests in Arracan, of which Dr Schlich in his report on the ironwood forests of Arracan, dated 1st September 1869, says that "a third of the forest vegetation consists of *Pinkado*," produce large numbers of telegraph poles and railway sleepers. Major Stenton in his report for 1876-77 said that 10,000 such sleepers from Arracan had then lately been sold at Calcutta at Rs. 5 each, and Mr Ribbentrop's Report states

C 1151.	Ahiri Reserve, Central Provinces . . . . .	Rs 59
W 751	South Kanara . . . . .	59
W 761.	" . . . . .	61
W 857.	" . . . . .	61
W 1222.	North Kanara . . . . .	62
B 805.	Tharrawaddi, Burma . . . . .	67
B 3066	Burma (1862) . . . . .	66
B 1151.	Taroy (Wallich, 1825) . . . . .	62

## 28. ACACIA, Willd.

Contains about 18 Indian species, of which four are climbing or straggling thorny shrubs, and the rest trees or erect shrubs. *A. Latronum*, Willd; Hook Fl Ind n 296. Beldome var.; Brandis 180. (*Mimosa Latronum*, Roxb Fl Ind n 559) Vern *Bhes*, Hind; *Pakulama*, Tel, is a gregarious, very thorny shrub of the



25. *DICHROSTACHYS*, DC.

1. *D. cinerea*, W. and A. ; Hook. Fl. Ind. ii. 288 ; Beddome t. 185 ; Brandis 171. *Mimosa cinerea*, Roxb. Fl. Ind. ii. 561. Vern. *Vartuli*, Hind. ; *Kunlai*, *kunrat*, *kheri*, Mhairwarra ; *Vadatalla*, *vadatarā*, Tam. ; *Velturu*, *yeltu*, Tel. ; *Segun kati*, Mar., Gondi ; *Andara*, Cingh.

A thorny shrub or small tree. Heartwood red, extremely hard. Pores moderate-sized, enclosed in rings of soft texture. Medullary rays short, moderately broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Dry, stony hills in South and Central India, Rajputana.

Weight, 75 lbs. per cubic foot. Wood used for walking-sticks.

No.	25.	Salem Collection.	.	.	.	.	.	.	lbs.
No.	3.	Ceylon Collection (marked <i>Vachellia farnesiana</i> )	.	.	.	.	.	.	79
P	3239.	Ajmere	.	.	.	.	.	.	71
P	3229.	Nagpahar, Ajmere	.	.	.	.	.	.	...

26. *MIMOSA*, Linn.

*M. pudica*, Linn. ; Hook. Fl. Ind. ii. 291. The Sensitive Plant. Vern. *Lajwānti* Kumaun ; *Lajuk*, Beng., is now naturalised over the greater part of tropical and sub-tropical India, where it grows to be a small shrub, and is with difficulty eradicated. *M. hamata*, Willd. ; Hook. Fl. Ind. ii. 291, is a prickly shrub of South India.

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A large, straggling, prickly shrub with grey bark. Sapwood yellowish white ; heartwood red, hard. Pores small and moderate-sized, frequently oval and subdivided. Medullary rays fine and very numerous.

Throughout the greater part of India, ascending to 4,000 feet in Kumaun and Sikkim.

Weight, 41 to 52 lbs. Used for gunpowder charcoal.

E	680.	Bamunpokri, Darjeeling Terai	.	.	.	.	.	.	lbs.
E	2354.	Chunbati, Darjeeling, 2,000 feet	.	.	.	.	.	.	41
									52

27. *XYLIA*, Bth.

1. *X. dolabriformis*, Benth. ; Hook. Fl. Ind. ii. 286 ; Beddome, t. 136 ; Brandis 171 ; Kurz i. 419. *Mimosa xylocarpa*, Roxb. Fl. Ind. ii. 543. *Inga xylocarpa*, DC. The Ironwood Tree of Pegu and Arracan. Vern. *Jambu*, Hind. ; *Jamba*, *suria*, Mar. ; *Boja*, Uriya ; *Irūl*, Tam. ; *Konda tangedu*, *tangedu*, *eruvalu*, *bojek*, Tel. ; *Jambé*, *tirawa*, Kan. ; *Shilve*, Coorg ; *Pynkado*, Burm.

A large deciduous tree. Bark  $\frac{1}{4}$  inch thick, grey or reddish brown, with short cracks irregularly distributed. Sapwood small ; heartwood dark brown or reddish brown, extremely hard, beautifully mottled, cross-grained, the fibres on a longitudinal section being wavy. Annual rings indistinct, but alternate concentric bands of darker and lighter colour. Pores small and moderate-sized, often subdivided into numerous compartments, and then oval or oblong. Pores or groups of pores in irregular patches of whitish tissue, which are often arranged in zig-zag lines. These patches are separated by hard, dark-coloured tissue in which the

very fine and very numerous medullary rays are distinctly visible. Some of the specimens of this wood have an oily touch

Chanda District South India Arracan and Burma

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured.	Weight	No of square inches	Size of bar	Value of p
Puckle	1850	Mysore	58		Ft in in 2 x 1 x 1	683
List of woods	1863		58			
Bran's No 37	1863	Burma	60.66			
Commisariat Department		Moulmein	83			1153
Skinner No 83	1862	South India	58			636
Benson		Burma	63		3 x 1 1/2 x 1 1/2	1191
Laurel	1855	"	73.5	6	7 x 6 x 6	655
Smythies	1858	Chanda	59	1		
	"	Kanara	61	4		
	"	Burma	60	3		

The wood is very durable—a property it doubtless owes in great measure to the resinous substance in wood from Tavoy

Barma, rs posts  
boat building and carts In Burma and Bengal it has been largely used for telegraph posts for which it has answered well The large forests in Arracan of which Dr Sellich in his report on the iron wood forests of Arracan dated 1st September 1869 says that a third of the forest vegetation consists of Pynkado produce large numbers of telegraph poles and railway sleepers Major Seaton in his report for 1876 77 said that 10000 such sleepers from Arracan had then lately been sold at Calcutta at 1 s 5 each and Mr Rubbentrop's Report states

C 1151	Alm Reserve Central Provinces	lbs
W 754	South Kanara	5)
W 761		5)
W 857		61
W 1222	North Kanara	62
B 405	Tharawalli Burma	67
B 3066	Burma (1852)	68
B 1151	Tavoy (Wallis 1825)	62

## 25 ACACIA, Willd

Contains about 18 Indian species of which four are climbing or scrambling thorny shrubs, and the rest trees or erect shrubs. *A. Latronum* Willd Hook Fl Ind 11 1: Bellome ex Brand 189 (*Mimosa Latronum* Loeb Fl Ind 1: 10) Vern *Lacc* R. H. *Lacc* Tel is a great tree very thorny

southern dry zone. *A. Jacquemonti*, Bth.; Hook. Fl. Ind. ii. 293; Brandis 183. Vern. *Hauza*, Afg.; *Kikar*, *babul*, *bamul*, Pb.; *Murmutti*, Berar; *Ratabauli*, Guz., is a small, bushy, thorny shrub of the arid and northern dry zones, ascending in the Suliman Range and Hazara to 3,200 feet; it is used for fodder, and the bark of the root in the distillation of spirits. *A. Senegal*, Willd.; Hook. Fl. Ind. ii. 295 (*A. rupestris*, Stocks; Brandis 181) Vern. *Khor*, Sind; *Kumta*, Rajputana, is a small thorny tree of the arid and northern dry zones, chiefly found in Sind and Ajmere. Brandis says, "Bark smooth, yellowish grey; wood light yellow, heavy and hard, with small irregular masses of black heartwood in the centre; it takes a beautiful polish, and is used for weavers' shuttles." It gives a gum which is collected and sold in Sind with that of *A. arabica*. *A. lenticularis*, Ham.; Hook. Fl. Ind. ii. 296; Brandis 186. Vern. *Khin*, Kumaun, is a small tree of the Siwaliks, of Kumaun and the Rajmehar hills in Bengal. *A. Suma*, Kurz; Hook. Fl. Ind. ii. 294; Brandis 187; Kurz i. 421 (*A. Catechu*, Bth.; Beddome t. 49, *Mimosa Suma*, Roxb. Fl. Ind. ii. 563.) Vern. *Saikanta*, Beng.; *Mugli*, Kan.; *Kumtia*, Pertabgarh; *Dhaua khejra*, Banswara; *Son kairi*, Dangs, is a tree of Bengal, South India, parts of the Central Provinces and Guzerat. It is recognised from *A. Catechu* by its having white bark, while that species has a black-coloured bark. It gives catechu, and the bark is used for tanning. *A. planifrons*, W. and A.; Hook. Fl. Ind. ii. 293; Beddome xcv.; Brandis 575. The Umbrella Thorn. Vern. *Salé*, *sal*, Tel., is a small gregarious tree of South India with a strong wood used for agricultural implements and fuel. *A. concinna*, DC.; Hook. Fl. Ind. ii. 296; Beddome xcv.; Brandis 188; Kurz i. 423; Gamble 33. (*Mimosa concinna*, Roxb. Fl. Ind. ii. 565). Vern. *Aila*, *rassaul*, Oudh; *Banritha*, Beng.; *Sikekat*, Dekkan; *Gogu*, *chikai*, Tel.; *Sigé*, Kan.; *Soopwotnway*, Burm., is an extremely thorny scandent shrub of most parts of India and Burma, except the arid zone. Its thick fleshy pods are used for washing the hair, and the acid leaves are eaten. *A. pruinescens*, Kurz i. 424, is a climber of the forests of Pegu.

The true gum arabic is the produce of *A. vera*, Willd., a tree of Egypt, Arabia and Northern Africa. "Sabicu" is the wood of *A. formosa*, a tree of the West Indies (W = 57; P = 994, Laslett).

The character of the Indian species of *Acacia* is to have sharp, prominent, medullary rays, which are short in *A. Catechu*, *ferruginea* and *modesta*, but long in the others; as a rule, they are not well marked on a radial section, but *A. leucophlœa* and *arabica* form an exception. The pores are, as a rule, uniform in size, but in *A. eburnea* they vary from small to large. With regard to their distribution, two series may be distinguished. In the first series the pores are isolated and enclosed in very narrow rings of softer tissue, and do not form concentric bands; to this section belong *A. arabica*, *modesta* and *ferruginea*. In the species of the second series, the pores are enclosed in elongated patches of softer tissue, which are frequently confluent and form distinct, though often irregular, concentric bands. This section includes *A. leucophlœa*, *eburnea*, *pennata* and *Catechu*. The Australian species have a different structure, and are all marked by short medullary rays.

1. *A. Farnesiana*, Willd.; Hook. Fl. Ind. ii. 293; Beddome t. 52; Brandis 180; Kurz i. 420. *Mimosa Farnesiana*, Linn.; Roxb. Fl. Ind. ii. 557. Vern. *Vilayati kikar*, *vilayati babul*, *pissi babul*, *gá-kikar*, Hind.; *Gúya babula*, Beng.; *Vedda vala*, Tam.; *Kusturi*, *piktúmi*, *oda sale*, *murki tumma*, Tel.; *Jáli*, Kan.

A thorny shrub. Wood white, hard, close-grained. Pores moderate-sized, in oblique and concentric interrupted bands of soft texture. Medullary rays fine, numerous.

Indigenous to America, now cultivated all over India. The gum is collected in Sind. It has yellow, extremely fragrant flowers, from which a perfume is made. It makes a good fence.

Weight, 49 lbs per cubic foot

P 3076 Sabathu, Punjab . . . . . 49

2. *A. arabica*, Willd ; Hook. Fl. Ind. ii. 293 ; Beddome t. 47 ; Brandis 180. *Mimosa arabica*, Roxb. Fl. Ind. ii. 557. Vern. *Kilar*, Pb. ; *Babbar*, Sind ; *Babûl*, *babûr*, Hind. ; *Karûvelum*, Tam. ; *Tûma*, *nella tûma*, Tel. ; *Gobli*, *karriyâli*, Kan.

A moderate-sized or large tree, seldom leafless, with dark brown rough bark. Sapwood large, whitish ; heartwood pinkish white, turning reddish brown on exposure, hard, mottled with dark streaks. Pores moderate-sized, sometimes large, oval and subdivided. Medullary rays fine and moderately broad, short, numerous, unequally distributed, conspicuous on a radial section. The wood consists of darker and lighter coloured bands of an equal width.

Cultivated or self-sown throughout the greater part of India, except in the most humid tracts near the coast Wild probably in Sind, Rajputana, Guzerat, and the Northern Dekkan

Brandis says " In the Punjab it attains a girth of 2½ feet in about 12 and 5 feet in about 30 years In the forests of Lower and Middle Sind, the average growth has been ascertained to be —

At 35 years 4 feet girth, at 4 feet from the ground

No.	Age	Girth at 4 feet	Height	Remarks
55	6	4	25	less than the

Compartment	Tree	Age	No of tree	Girth at 4 feet	Height
1	Chandrawâl	7½	4	23 5	25 30
3	Kudsi	6	4	13 5	25
4	Jâfir Khan	6	7	17	18 to 25

Chandrawâl is probably on better soil than the others, as the rate of growth is 2 rings per inch as against 2.2 and 2.8 in Nos 3 and 4 respectively.

No.	Age	Girth at 4 feet	Height	Remarks
1	6	4	25	less than the
2	6	4	25	less than the
3	6	4	25	less than the
4	6	4	25	less than the
5	6	4	25	less than the
6	6	4	25	less than the
7	6	4	25	less than the
8	6	4	25	less than the
9	6	4	25	less than the
10	6	4	25	less than the
11	6	4	25	less than the
12	6	4	25	less than the
13	6	4	25	less than the
14	6	4	25	less than the
15	6	4	25	less than the
16	6	4	25	less than the
17	6	4	25	less than the
18	6	4	25	less than the
19	6	4	25	less than the
20	6	4	25	less than the
21	6	4	25	less than the
22	6	4	25	less than the
23	6	4	25	less than the
24	6	4	25	less than the
25	6	4	25	less than the
26	6	4	25	less than the
27	6	4	25	less than the
28	6	4	25	less than the
29	6	4	25	less than the
30	6	4	25	less than the
31	6	4	25	less than the
32	6	4	25	less than the
33	6	4	25	less than the
34	6	4	25	less than the
35	6	4	25	less than the
36	6	4	25	less than the
37	6	4	25	less than the
38	6	4	25	less than the
39	6	4	25	less than the
40	6	4	25	less than the
41	6	4	25	less than the
42	6	4	25	less than the
43	6	4	25	less than the
44	6	4	25	less than the
45	6	4	25	less than the
46	6	4	25	less than the
47	6	4	25	less than the
48	6	4	25	less than the
49	6	4	25	less than the
50	6	4	25	less than the
51	6	4	25	less than the
52	6	4	25	less than the
53	6	4	25	less than the
54	6	4	25	less than the
55	6	4	25	less than the
56	6	4	25	less than the
57	6	4	25	less than the
58	6	4	25	less than the
59	6	4	25	less than the
60	6	4	25	less than the
61	6	4	25	less than the
62	6	4	25	less than the
63	6	4	25	less than the
64	6	4	25	less than the
65	6	4	25	less than the
66	6	4	25	less than the
67	6	4	25	less than the
68	6	4	25	less than the
69	6	4	25	less than the
70	6	4	25	less than the
71	6	4	25	less than the
72	6	4	25	less than the
73	6	4	25	less than the
74	6	4	25	less than the
75	6	4	25	less than the
76	6	4	25	less than the
77	6	4	25	less than the
78	6	4	25	less than the
79	6	4	25	less than the
80	6	4	25	less than the
81	6	4	25	less than the
82	6	4	25	less than the
83	6	4	25	less than the
84	6	4	25	less than the
85	6	4	25	less than the
86	6	4	25	less than the
87	6	4	25	less than the
88	6	4	25	less than the
89	6	4	25	less than the
90	6	4	25	less than the
91	6	4	25	less than the
92	6	4	25	less than the
93	6	4	25	less than the
94	6	4	25	less than the
95	6	4	25	less than the
96	6	4	25	less than the
97	6	4	25	less than the
98	6	4	25	less than the
99	6	4	25	less than the
100	6	4	25	less than the

It comes up well self sown, coppices well, and may be grown from cuttings It sheds down a very long taproot

No.	Age	Girth at 4 feet	Height	Remarks
P 1108	Madhopûr, Punjab	6	4	25
P 890	Multân	6	4	25
P 1379	Mirni Forest, Sind	6	4	25
P 440	Ajmere	6	4	25
C 843	Amrohti, Râwar	6	4	25
D 1051	Salem, Madras	6	4	25
No 1	Salem Collection	6	4	25

3. *A. eburnea*, Willd. ; Hook. Fl. Ind. ii. 293 ; Brandis 183. *Mimosa eburnea*, Roxb. Fl. Ind. ii. 555. Vern. *P* . . .

A short or small deciduous tree, with rough, dark-grey bark. Wood hard, yellowish white, extremely hard, splits in drying. Pores moderate-sized and large, often oval and subdivided into compartments enclosed in wavy and irregular concentric bands of softer tissue, which are frequently interrupted. Medullary rays fine and moderately broad, wavy, prominent in the bands of darker and finer tissue, which alternate with those of soft texture.

Sind, Suliman range, Berar, Dekkan and South India.

Weight, 52 lbs. per cubic foot.

C 844. Amraoti Reserve, Berar	lbs.
	52

4. *A. leucophlœa*, Willd.; Hook. Fl. Ind. ii. 294; Beddome t. 48; Brandis 184; Kurz i. 421. *Mimosa leucophlœa*, Roxb. Fl. Ind. ii. 558. Vern. *Rerû, raunj, karîr, nimbar, ringa, rinj, rohani, jhind, safed kîkar*, Hind.; *Arinj*, Rajputana; *Raundra, runjra*, Banswara; *Rennja*, Bijeragogarh; *Tumma*, Gondi; *Hewar*, Mar.; *Velvaylam, vel-vaghe*, Tam.; *Tella-tûma, harwar*, Tel.; *Bili jâli, topal, naibela*, Kan.; *Katu andara*, Cingh.; *Tanoung*, Burm.

A moderate-sized or large deciduous tree. Bark  $\frac{1}{2}$  inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, extremely hard. Pores moderate-sized, uniformly distributed in patches of short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent.

Plains of the Punjab from Lahore to Delhi, and in all forest tracts of Central and South India and Burma.

Weight, Skinner, No. 5, gives 55 lbs.; R. Thompson, 58 lbs.; and Central Provinces List of 1873, 45 lbs.; our specimens give 50 and 59 lbs. Skinner gives P=861. It seasons well and takes a good polish; is strong and tough, but often eaten by insects. It gives an excellent fuel. The bark is eaten in times of scarcity; it is used in preparing spirits from sugar and palm juice, to precipitate by the tannin it contains the albuminous substances in the juice. It gives a fibre used for nets and coarse cordage. The young pods and seeds are eaten, and the gum is used in native medicine.

P 947. Lahore	lbs.
C 1118. Ahiri Reserve, Central Provinces	50
	59

5. *A. modesta*, Wall.; Hook. Fl. Ind. ii. 296; Brandis 185. *Mimosa dumosa*, Roxb. Fl. Ind. ii. 559, and probably *M. obovata*, Roxb. l.c. 561. Vern. *Palosa*, Afg.; *Phulahi*, Pb.

A thorny, moderate-sized, deciduous tree. Bark rough, with a multitude of narrow irregular cracks. Sapwood large, white, perishable; heartwood dark brown, with black streaks, extremely hard, harder than that of *A. Catechu*. Pores moderate-sized, sometimes joined by narrow bands of white tissue. Medullary rays fine, white, short.

Suliman and Salt Ranges, Sub-Himalayan tract between the Indus and the Sutlej, and the northern part of the Punjab plains.

Growth slow. Weight, according to J. L. Stewart, 55 lbs.; our specimens vary from 67 to 72; average 69 lbs. A most beautiful wood, strong and durable; valuable for cart-wheels, sugarcane crushers, Persian water-wheels and agricultural implements.

It gives a gum used in native medicine The leaves and fallen blossoms are collected for cattle fodder

P 161	Hoshuarpur (J L Stewart, 1866)	lbs
P 911	Gujerat	72
P 945	Multan	68
		67

6 *A. ferruginea*, DC ; Hook Fl Ind ii 295; Beddome t 51; Brandis 185, Kurz i 423, Gamble 32 *Mimosa ferruginea*, Roxb Fl. Ind ii 561 Vern *Khaur*, Nep, *Kaiger*, Panch Mehrls, *Son khaur*, Berar, *Kar khaur*, Gond, *Phandra khaur*, Mar., *Teori khaur*, Bhil, *Bann*, Kan, *Felvelam*, Tam, *Ausandra*, *tella tuma*, *win*, Tel

A large deciduous tree Bark  $\frac{1}{2}$  inch thick, rough Sapwood large, heartwood olive brown, extremely hard, harder than *A Catechu* Pores moderate-sized, generally single, in small rounded patches of softer tissue, which are often confluent and joined into short interrupted concentric bands Medullary rays short, white, fine, numerous.

North-east Bengal Central

imens give 70 lbs. Skinner says it is used for building, similar to gum arabic

G 872	Bairagarh Reserve, Berar	lbs
E 2357	Bamunpokri Darjeeling Terai	70
D 1081	North Arcot	67
		73

A piece of red wood B 2529 (57 lbs) collected in Burma in 1862 and marked *S/a*, has large and moderate-sized pores filled with resin, they are often subdivided and their transverse diameter is greater than the distance between the fine closely packed and prominent medullary rays It evidently belongs to a species of *Acacia* and in structure resembles *A ferruginea*, which has not yet been described from Burma

7. *A. Catechu*, Willd, Hook Fl Ind ii 295, Brandis 186, Kurz i. 422, Gamble 32 *A Sundra*, Beddome t 50 *Mimosa Sundra*, Roxb. Fl Ind ii 562 Vern. *Khaur*, Hind, *Khaur*, *koir*, *Ara*, *Khaur*, Uriya, *Karangalli*, *bagu*, Tam, *Sandra*, *nalla sandra*, Tel, *Kagli*, Kan, *Rat khiri*, Singh, *Sha*, Burm

A moderate-sized, gregarious, thorny, deciduous tree Bark dark grey or greyish brown, rough, exfoliating in long narrow strips Sapwood yellowish white, heartwood either dark or light red, extremely hard The wood grown in the Himalayan valleys shows the annual rings marked by a whitish line and by a larger number of pores in the spring wood. Pores moderate-sized and large, often subdivided occasionally in radial groups of 2 or 3, and surrounded by narrow rings of softer tissue which are often joined and form interrupted concentric bands Pores frequently filled with a white substance, uniformly distributed except that they are more numerous in the innermost part of each annual ring, distinctly marked on a longitudinal section Medullary rays short, moderately broad, numerous, bent where they touch the pores, which are often larger than the space between two medullary rays

Common in most parts of India and Burma

A short or small deciduous tree, with rough, dark-grey bark. Wood hard, yellowish white, extremely hard, splits in drying. Pores moderate-sized and large, often oval and subdivided into compartments enclosed in wavy and irregular concentric bands of softer tissue, which are frequently interrupted. Medullary rays fine and moderately broad, wavy, prominent in the bands of darker and finer tissue, which alternate with those of soft texture.

Sind, Suliman range, Berar, Dekkan and South India.

Weight, 52 lbs. per cubic foot.

C 814. Amraoti Reserve, Berar	. . . . .	lbs.
		52

4. *A. leucophlœa*, Willd.; Hook. Fl. Ind. ii. 294; Beddome t. 48; Brandis 184; Kurz i. 421. *Mimosa leucophlœa*, Roxb. Fl. Ind. ii. 558. Vern. *Rerû, raunj, karûr, nimbar, ringa, rinj, rohani, jhind, safed kihar*, Hind.; *Arinj*, Rajputana; *Raundra, runjra*, Banswara; *Renuja*, Bijeragogarh; *Tumma*, Gondi; *Hewar*, Mar.; *Telvaylam, vel-vaghe*, Tam.; *Tella-tûma, harwar*, Tel.; *Bili-jûli, topal, naibela*, Kan.; *Katu andara*, Cingh.; *Tanoung*, Burm.

A moderate-sized or large deciduous tree. Bark  $\frac{1}{2}$  inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, extremely hard. Pores moderate-sized, uniformly distributed in patches or short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent.

Plains of the Punjab from Lahore to Delhi, and in all forest tracts of Central and South India and Burma.

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P 947. Lahore	. . . . .	lbs.
C 1118. Ahiri Reserve, Central Provinces	. . . . .	50
		59

5. *A. modesta*, Wall.; Hook. Fl. Ind. ii. 296; Brandis 185. *Mimosa dumosa*, Roxb. Fl. Ind. ii. 559, and probably *M. obovata*, Roxb. l. c. 561. Vern. *Palosa*, Afg.; *Phulahi*, Pb.

A thorny, moderate-sized, deciduous tree. Bark rough, with a multitude of narrow irregular cracks. Sapwood large, white, perishable; heartwood dark brown, with black streaks, extremely hard, harder than that of *A. Catechu*. Pores moderate-sized, sometimes joined by narrow bands of white tissue. Medullary rays fine, white, short.

Suliman and Salt Ranges, Sub-Himalayan tract between the Indus and the Sutlej, and the northern part of the Punjab plains.

Growth slow. Weight, according to J. L. Stewart, 55 lbs.; our specimens vary from 67 to 72; average 69 lbs. A most beautiful wood, strong and durable; valuable for cart-wheels, sugarcane crushers, Persian water-wheels and agricultural implements.

It gives a gum used in native medicine. The leaves and fallen blossoms are collected for cattle fodder

P 164	Hoshurpur (J L Stewart 1866)	lbs
P 941	Gujerat	72
P 915	Multan	68
		67

6 *A. ferruginea*, DC, Hool Fl Ind n 295, Beddome t 51, Brandis 185, Kurz 1 423, Gamble 32 *Mimosa ferruginea*, Roxb Fl Ind n 561 Vern *Khaur*, Nep, *Karge*, Berar, *Kar khaur*, Gond, *Phandra khaur*, N Kan, *Felvelam*, Tam, *Ausandra*, *tella tuma*, wunt, Tel

A large deciduous tree Bark  $\frac{1}{2}$  inch thick, rough Sapwood large, heartwood olive brown, extremely hard, harder than *A Catechu* Pores moderate sized, generally single, in small rounded patches of softer tissue, which are often confluent and joined into short interrupted concentric bands Medullary rays short, white, fine, numerous.

imens give 70 lbs. Skinner says it is used for building, similar to gum arabic

C 872.	Bauragarh Reserve Berar	lbs
E 2357	Damunpokri Darjeeling Terni	70
D 1081	North Arcot	67
		73

A piece of red wood B 2529 (57 lbs) collected in Burma in 1862 and marked *S/a* 1 1 1 Large and moderate-sized pores filled with resin they are often subdivided and their transverse diameter is greater than the distance between the fine closely packed and prominent medullary rays It evidently belongs to a species of *Acacia* and in structure resembles *A ferruginea*, which has not yet been described from Burma

7. *A Catechu*, Willd, Hool Fl Ind n 295, Brandis 186, Kurz 1 422, Gamble 32 *A Sundra*, Beddome t 50 *Mimosa Sundra*, Roxb Fl Ind n 562 Vern *Khaur*, Hind, *Ahoira*, *koir*, Ass, *Akhaur*, Uriya, *Karangalli*, *baga*, Tam, *Sandra*, *nalla sandra*, Tel, *Aagli*, Kan, *Ital khaur*, Cingh, *Shi*, Burm

A moderate sized, gregarious, thorny, deciduous tree Bark dark grey or greyish brown, rough, exfoliating in long narrow strips Sapwood yellowish white, heartwood either dark or light red, extremely hard The wood grown in the Himalayan valleys shows the annual rings marked by a whitish line and by a larger number of pores in the spring wood Pores moderate sized and large, often subdivided occasionally in radial groups of 2 or 3, and surrounded by narrow rings of softer tissue which are often joined and form interrupted concentric bands Pores frequently filled with a white substance, uniformly distributed except that they are more numerous in the innermost part of each annual ring, distinctly marked on a longitudinal section Medullary rays short, moderately broad, numerous, bent where they touch the pores, which are often larger than the space between two medullary rays

Common in most parts of India and Burma extending to the S. E. of the



A short or small deciduous tree, with rough, dark-grey bark. Wood hard, yellowish white, extremely hard, splits in drying. Pores moderate-sized and large, often oval and subdivided into compartments enclosed in wavy and irregular concentric bands of softer tissue, which are frequently interrupted. Medullary rays fine and moderately broad, wavy, prominent in the bands of darker and finer tissue, which alternate with those of soft texture.

Sind, Suliman range, Berar, Dekkan and South India.

Weight, 52 lbs. per cubic foot.

C 844. Amraoti Reserve, Berar	lbs.
	52

4. *A. leucophlœa*, Willd.; Hook. Fl. Ind. ii. 294; Beddome t. 48; Brandis 184; Kurz i. 421. *Mimosa leucophlœa*, Roxb. Fl. Ind. ii. 558. Vern. *Rerû, raunj, karîr, nimbar, ringa, rinj, rohani, jhind, safed kîkar*, Hind.; *Arinj*, Rajputana; *Raundra, runjra*, Banswara; *Renuja*, Bijera-gogarh; *Tumma*, Gondi; *Hewar*, Mar.; *Velvaylam, vel-vaghe*, Tam.; *Tella-tûma, harwar*, Tel.; *Bili jâli, topal, naibela*, Kan.; *Katu andara*, Cingh.; *Tanoung*, Burm.

A moderate-sized or large deciduous tree. Bark  $\frac{1}{2}$  inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, extremely hard. Pores moderate-sized, uniformly distributed in patches or short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent.

Plains of the Punjab from Lahore to Delhi, and in all forest tracts of Central and South India and Burma.

Weight, Skinner, No. 5, gives 55 lbs.; R. Thompson, 58 lbs.; and Central Provinces List of 1873, 45 lbs.; our specimens give 50 and 59 lbs. Skinner gives P=861. It seasons well and takes a good polish; is strong and tough, but often eaten by insects. It gives an excellent fuel. The bark is eaten in times of scarcity; it is used in preparing spirits from sugar and palm juice, to precipitate by the tannin it contains the albuminous substances in the juice. It gives a fibre used for nets and coarse cordage. The young pods and seeds are eaten, and the gum is used in native medicine.

P 947. Lahore	lbs.
C 1118. Ahiri Reserve, Central Provinces	50
	59

5. *A. modesta*, Wall.; Hook. Fl. Ind. ii. 296; Brandis 185. *Mimosa dumosa*, Roxb. Fl. Ind. ii. 559, and probably *M. obovata*, Roxb. l. c. 561. Vern. *Palosa*, Afg.; *Phulahi*, Pb.

A thorny, moderate-sized, deciduous tree. Bark rough, with a multitude of narrow irregular cracks. Sapwood large, white, perishable; heartwood dark brown, with black streaks, extremely hard, harder than that of *A. Catechu*. Pores moderate-sized, sometimes joined by narrow bands of white tissue. Medullary rays fine, white, short.

Suliman and Salt Ranges, Sub-Himalayan tract between the Indus and the Sutlej, and the northern part of the Punjab plains.

Growth slow. Weight, according to J. L. Stewart, 55 lbs.; our specimens vary from 67 to 72; average 69 lbs. A most beautiful wood, strong and durable; valuable for cart-wheels, sugarcane crushers, Persian water-wheels and agricultural implements.

It gives a gum used in native medicine. The leaves and fallen blossoms are collected for cattle fodder.

P 161	Hosharpur (J. L. Stewart 1866)	lbs 72
P 944	Gujarat	68
P 915	Multan	67

6 *A. ferruginea*, DC, Hook Fl Ind ii 295; Beddome t 51, Brandis 185, Kurz i 423, Gamble 32. *Mimosa ferruginea*, Roxb Fl Ind ii 561. Vern *Khoni*, Nep, *Kanger*, Panch Mehals, *Son khair*, Berar, *Kar khair*, Gondi, *Phandria khair*, Mar., *Tebri khair*, Bhil, *Banni*, Kan, *Felvelam*, Tam, *Ansandra*, *tella tuma*, *wani*, Tel.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, rough. Sapwood large, heartwood olive brown, extremely hard, harder than *A. catechu*. Pores moderate sized, generally single, in small rounded patches of softer tissue, which are often confluent and joined into short interrupted concentric bands. Medullary rays short, white, fine, numerous.

North-eastern Himalayas

immense gum 70 lbs. Skinner says it is used for building, similar to gum arabic.

C 872	Barragarh Reserve Berar	lbs
E 2357	Bamunpokhi Darjeeling Terai	70
D 1081	North Arcoot	67
		73

A piece of red wood B 2529 (57 lbs) collected in Burma in 1862 and marked *Sia*, has large and moderate-sized pores filled with resin, they are often subdivided and their transverse diameter is greater than the distance between the fine closely packed and prominent medullary rays. It evidently belongs to a species of *Acacia* and in structure resembles *A. ferruginea* which has not yet been described from Burma.

7 *A. catechu*, Willd, Hook Fl Ind ii 295, Brandis 186, Kurz i 422, Gamble 32. *A. Sundra*, Beddome t 50. *Mimosa Sundra*, Roxb Fl Ind ii 562. Vern *Khair*, Hind, *Khaur*, *kaur*, Ass, *Khair*, Uriya, *Karangalli*, *baga*, Tam, *Sandra*, *nalla sandra*, Tel, *Karli*, Kan, *Rat khiri*, Singh, *Sha* Burm.

A moderate sized, gregarious, thorny, deciduous tree. Bark dark grey or greyish brown, rough, exfoliating in long narrow strips. Sapwood yellowish white, heartwood either dark or light red, extremely hard. The wood grown in the Himalayan valleys shows the annual rings marked by a whitish line and by a larger number of pores in the spring wood. Pores moderate sized and large, often subdivided concentrically in radial groups of 2 or 3, and surrounded by narrow concentric bands of tissue which are often joined and form interrupted concentric bands. Pores frequently filled with a white substance, uniformly distributed except that they are more numerous in the innermost part of each annual ring, distinctly marked on a longitudinal section. Medullary rays short, moderately broad, numerous, bent where they touch the pores, which are often larger than the space between two medullary rays.

Common in most parts of India and Burma, extending in the Sub-Himalayan tract westwards to the Indus.

The growth of the Himalayan trees whose rings being 5 rings per inch.

Weight, 43 to 52 lbs. per cubic foot. The wood is used to make furniture. The tree is extremely handsome when in flower, with its innumerable pink tassels of delicate silky blossoms, from which it derives its name *guláb-resham*, rose silk.

II 97.	Sutlej Valley, Simla, 4,000 feet	lbs.
II 152.	Sainj, Simla, 4,000 feet	52
		43

6. *A. stipulata*, Boivin; Hook. Fl. Ind. ii. 300; Beddome t. Fl.; Brandis 178; Kurz i. 426; Gamble 34. *Mimosa stipulacea*, Roxb. 55, Ind. ii. 549. Vern. *Oi, oö, sirín, shirsha, kasír*, Pb.; *Siran, kanujer a. pattia, samsundra*, Hind.; *Kala siris*, Nep.; *Singriang*, Lepcha; *Sow*, Ass.; *Selcho*, Garo; *Chakua, ambuki*, Beng.; *Kat turanji*, Tam.; *Konda chiragu, chindaga*, Tel.; *Kal baghi, hote baghi*, Kan.; *Kabal*, Cingh.; *Pokoh*, Magh; *Boomaiza*, Burm.

A large, deciduous, fast-growing tree. Bark grey, with numerous short, vertical wrinkles and a few larger horizontal furrows, with prominent edges, darker when old. Sapwood large, white; heartwood brown, generally not durable, soft, shining. Annual rings distinctly marked. Pores large, often oval and subdivided, very prominent on a longitudinal section. Medullary rays fine, short, reddish, not very distinct.

Sub-Himalayan tract from the Indus eastwards, ascending to 4,000 feet; Oudh, Bengal, Burma, South India.

Growth very rapid. Roxburgh says that a tree he planted in the Botanic Garden at Calcutta measured 48·5 inches in girth at 4 feet above the ground when 7 years old; this would give a rate of growth of slightly less than 1 ring per inch of radius. Stewart, in "Punjab Plants, p. 56," says that a tree in the Saharanpur Gardens was 7 feet in girth at about 17 years of age, which gives rather over 1 ring per inch of radius. Our specimens give 3 to 4 rings per inch of radius. A round in the Bengal Forest Museum from a young tree, shews 11 rings on a mean radius of 6 inches or 1·8 rings per inch of radius. The growth may be taken therefore at 1 to 4 rings per inch of radius, which is very rapid. Weight, according to Skinner, No. 9, 55 lbs.; according to Brandis' Burma List of 1862, No. 27, 66 lbs.; our specimens give only 33 lbs.; and Kyd (*Acacia marginata*, Ham.) 28 lbs. Kyd gives  $P = 222$ ; and Skinner gives  $P = 823$ ; but it is doubtful if his experiments were really from wood of *A. stipulata*. The wood is said by Beddome, probably quoting Skinner, to be used for building and for naves of wheels. Kurz says it is good for cabinet work, furniture and similar purposes. Brandis' Burma List, 1862, No. 27, says it is prized for cart-wheels and for the bells of cattle. In Bengal it has been tried for tea-boxes, for which purpose it will probably suit well; also for charcoal. It gives a gum which exudes copiously from the stem, and is used by Nepalese for sizing their "Daphne" paper. The branches are topped for cattle fodder.

H 603.	Kangra, Punjab	lbs.
O 217.	Garhwal (1868)	29
C 2989.	Jubbulpore, Central Provinces (1863)	28
E 647.	Bamunpokri, Darjeeling Terai	39
E 2362.	" "	26
E 788.	Kamrúp, Assam	29
E 1956.	Chittagong	40
B 809.	Burma	25
B 2528.	" (1866)	36
B 2221.	Andaman Islands (1866)	33
		45

7. *A. amara*, Boivin; Hook. Fl. Ind. ii. 301; Brandis 178. *A. amara* and *A. Wightii*, Grah.; Beddome t. 61, xevi. *Mimosa amara* and *M. pulchella*, Roxb. Fl. Ind. ii. 548. Vern. *Lallei*, Dekkan; *Thuringi, vónja, suranji, shekram*, Tam.; *Nallarenga, shekrani, sikkai, narlingi*, Tel.; *Bel-khambi*, Kan.; *Kadsige*, Coorg; *Oosulay*, Mal.

A moderate-sized deciduous tree. Sapwood large; heartwood pur-

plish-brown, beautifully mottled, extremely hard, with alternate, concentric, light and dark bands. Pores small, in patches of white tissue, which are frequently joined, forming concentric bands. Medullary rays very fine, very numerous.

South India and Dekkan

to 62lbs Skinner  
tiff, close grained,  
and direct cohesive  
power, also that it is used for the beams of native houses and carts, the wood of the  
crooked branches for ploughs and the leaves for washing the hair Beddome says it is  
a good fuel, and is extensively used for the locomotives at Salem and Bangalore

D 1052	Salem, Madras	.	.	.	.	.	lbs
No 6	Salem Collection	.	.	.	.	.	61
							62

B 2705 (59 lbs) from Tavoy (Wallich, 1828) is a dark red specimen of a heavy brown wood of *Albizia* structure, which cannot be identified

## ORDER XII. ROSACEÆ

Contains 20 genera of Indian trees, shrubs or climbers chiefly found in the colder regions of the Himalaya and other mountain ranges It is divided into 7 Tribes,

Tribe	I — Chrysobalanæ		<i>Parinarium</i> and <i>Parastemon</i>
"	II — Prunæ	.	<i>Prunus</i> , <i>Maddenia</i> , <i>Pygeum</i> and <i>Prinsepia</i>
"	III — Spirææ	.	<i>Spiræa</i> and <i>Neillia</i>
"	IV — Rubæ	.	<i>Rubus</i>
"	V — Potentillæ	.	<i>Potentilla</i>
"	VI — Rosæ	.	<i>Rosa</i>
"	VII — Pomeæ	.	<i>Cydonia</i> , <i>Docynia</i> , <i>Eriobotrya</i> , <i>Pyrus</i> , <i>Photinia</i> , <i>Pourthia</i> , <i>Stranvæna</i> , <i>Crataegus</i> and <i>Cotoneaster</i>

xviii., is a small tree of the Nilgiris; *P. Notoniana*, Wight and Arn.; Beddome t. 192 (*Eriobotrya integrifolia*, Kurz i. 442) Vern. *Kaddi bilkki*, Burghers, is a small tree of Eastern Bengal, South India and Burma; *P. integrifolia*, Lindl.; *P. Griffithii*, Dene; and *P. mollis*, Hook. f., are trees of the North-East Himalaya. *Pourthiæ arguta*, Dene; Hook. Fl. Ind. ii. 382, is a small tree of the Khasia Hills and Sikkim Terai.

Wood close and even grained; that of most species apt to warp. Pores small to extremely small. Medullary rays generally fine to extremely fine.

## 1. PRUNUS, Linn.

Contains 18 species including the Almond, Peach, Apricot, Plum and Cherry. *P. prostrata*, Labill.; Hook. Fl. Ind. ii. 313; Brandis 193. Vern. *Tára, ter, talle*, Pb., is a small shrub of rocky places in Afghanistan and the arid parts of the North-West Himalaya, generally above 7,000 feet. *P. Mahaleb*, Linn.; Brandis 195, is cultivated at Khelat. *P. rufa*, Wall.; Hook. Fl. Ind. ii. 314 (*P. sp.*, Gamble 35) Vern. *Kamki*, Bhutia, is a tree of the inner Sikkim Himalaya above 10,000 feet. *P. punctata*, Hook. f. and Th., is a small tree of the Khasia Hills; and *P. Jenkinsii*, Hook. f. and Th., a small tree of Upper Assam. *P. tomentosa*, Thunb.; Hook. Fl. Ind. ii. 314, is a shrub of Kashmir; and *P. Jacquemontii*, Hook. f., a shrub of the inner North-West Himalaya in Kunawar and Garhwal.

*P. Amygdalus*, Baillon; Brandis 190. (*Amygdalus communis*, Willd.; Roxb. Fl. Ind. ii. 500.) The Almond. Vern. *Badám*, is cultivated in Afghanistan, Persia, Kashmir and the Punjab. *P. Cerasus*, Linn.; Brandis 193. The Cherry. Vern. *Alí balú*, Pers.; *Kerasya*, Arab.; *Gílás, olchi, krusbal*, Pb., is generally cultivated in the North-West Himalaya between 5,000 and 8,000 feet. *P. Persica*, Bth. and Hk. f.; Hook. Fl. Ind. ii. 313; Brandis 191; Kurz i. 433; Gamble 34. (*Amygdalus persica*, Willd.; Roxb. Fl. Ind. ii. 500). The Peach. Vern. *Ghwareshdtá*, Afg.; *Shíft alú*, Pers.; *Aru, aor, chinannu, beinni, beimu, rek*, Pb.; *Aru*, Hind.; *Tukpo*, Lepcha, is commonly cultivated everywhere throughout the Himalaya and in Upper Burma.

The species here described have a distinct heartwood; the pores are small or very small. The medullary rays are generally of two classes, fine and moderately broad. The annual rings are marked either by a continuous line of pores or by more numerous pores in the spring wood.

1. *P. armeniaca*, Linn.; Hook. Fl. Ind. ii. 313; Brandis 191; Roxb. Fl. Ind. ii. 501. The Apricot. Vern. *Hári, gardalu, jaldaru, shíran, cheroli, cher kúsh, serkuji, shari*, Pb.; *Iser*, Kashmir; *Chúari, zardalu, khoobani*, Hind.; *Mishmish*, Pers.

A moderate-sized deciduous tree. Bark dark brown, rough, with narrow longitudinal clefts. Sapwood white; heartwood greyish brown, mottled with dark-brown streaks, moderately hard. Annual rings marked by a narrow continuous belt of pores, which are larger than the very small scattered pores in the outer portion of the ring. Medullary rays of two classes, numerous; very fine rays between fewer moderately broad ones.

Cultivated in the North-West Himalaya. Growth moderate, 4 to 8 rings per inch of radius.

Weight, 49 lbs. per cubic foot; Mathieu, Fl. For. p. 131, gives 58 lbs. Wood handsome, used for various purposes in the Punjab Hills. In Lahoul and Upper Kanawar it is the chief firewood. The fruit, fresh or dried, is extensively used for food, and an oil is extracted from the kernels which is used to burn, in cooking and for the hair.

H 781.	Bathri, Chamba, 3,000 feet	.	.	.	.	.	lbs.
H 20.	Madhan, Simla, 6,000 feet	.	.	.	.	.	49
H 2876.	Matiyána, Simla, 7,000 feet	.	.	.	.	.	...

2. *P. communis*, Huds.; Hook. Fl. Ind. ii. 315; Brandis 192. The Plum. Vern. *Alúcha, olchi, er, aor, gardalu*, Pb.

A moderate-sized tree. Wood reddish brown, hard, very close-grained, warps and splits. Annual rings marked by a belt of small, closely packed pores. Pores in the main portion of the annual ring extremely small, in groups. Medullary rays of two classes, moderately broad, numerous, with very fine rays between them.

Cultivated (or indigenous, Hook Fl Ind) from Garhwal to Kashmir in the Western Himalaya, from 5,000 to 7,000 feet

Growth fast, 2 to 3 rings per inch of radius. Weight, 52 lbs per cubic foot. The wood is smooth to work, and is used in Kashmir for the skeleton of the so called papier-maché boxes

H 151.	Giri Valley, Simla, 4,000 feet	lbs 52
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3. *P. Puddum*, Roxb.; Hook. Fl. Ind. ii. 314, Brandis 194; Kurz i 434.; Gamble 34. Vern. *Chamārī, amalguḥ, pāya, payia*, Pb., *Paddam, pāya*, Hind.; *Kongli*, Lepcha.

A moderate-sized (in Sikkim, a large) deciduous tree. Bark peeling  
Sapwood large, greenish white.  
on a radial section by narrow,  
ately hard. Annual rings dis-  
tinctly marked by an irregular and not continuous belt of numerous  
pores. Pores small; those of the spring wood very small, fre-  
quently arranged in oblique lines intersecting the medullary rays at an  
angle. Medullary rays of two classes; numerous, very fine rays alter-  
nating with fewer, short, moderately broad rays, which are broader than  
those of *P. Padus*. Scent pleasant, resembling that of *P. Mahaleb*.

Wild in the Himalaya, from the Indus to Assam, between 2,500 and 7,000 feet,  
Khasia Hills

Growth variable, from 1 to 22 rings per inch of radius, the average being 12

Weight, the average of our specimens give 41 lbs per cubic foot. Gamble says 40 to 45 lbs

The wood is used in the Punjab Himalaya for walking-sticks; in Darjeeling occasionally for furniture. It deserves to be better known, and to be more extensively used, as, at any rate in Sikkim, it is common and reaches a large size. It gives an abundant gum, not used

H 46	Nagkanda, Simla, 7,000 feet	lbs 52
H 234	Garhwal Hills (1868)	16
E 683	" " " " " "	12
E 2363	" " " " " "	41
E 2361	" " " " " "	18
E 1417.	" " " " " "	37

4. *P. Padus*, Linn.; Hook. Fl. Ind. ii. 315; Brandis 194; Gamble 35. The Bird Cherry. Vern. *Pāras, kalakat, gidar-dāk, bart, zām, zam, zambu, jamu, chūle, dūdla, krún*, Pb.; *Jamana*, Hind.; *Likh-aru, arupatti*, Nep.; *Illo sa hlot-kúng*, Lepcha.

A moderate-sized deciduous tree, with dark, rough bark. Sapwood large, whitish. Heartwood reddish brown, with an unpleasant smell, beautifully mottled on a radial section by the shining medullary rays, marked by a narrow belt of  
small, in irregularly shaped  
Medullary rays short, moder-  
ately broad.

Himalaya, from the Indus to Sikkim, between 4,000 and 10,000 feet.

Growth, varying from 1 to 30 rings per inch of radius, the average of our speci-

mens gave 13 rings. Average weight 41 lbs. per cubic foot, Mathien Fl. For. p. 128, gives an average of 41.5 lbs. The wood has often a very handsome grain and deserves to be better known; it is scarcely ever used.

H	916.	Hazara, 7,000 feet	. . . . .	lbs.
H	22.	Matiyāna, Simla, 7,000 feet	. . . . .	38
H	58.	Nagkanda, Simla, 8,000 feet	. . . . .	42
E	696.	Rangbūl Forest, Darjeeling, 7,000 feet	. . . . .	43
E	2369.	" " " " " "	. . . . .	41
		" " " " " "	. . . . .	42

The two Darjeeling specimens are perhaps *P. nepalensis*, Ser.; Hook. Fl. Ind. 316.

5. *P. acuminata*, Wall.; Hook. Fl. Ind. ii. 317; Gamble 35 (*wrongly* Roxb.).

A tree with thin dark bark. Wood reddish brown. Pores small, sometimes in groups or radial lines; medullary rays of two classes; numerous, very fine rays, alternating with fewer, short, broad ones.

Eastern Himalaya and Khasia Hills from 4,000 to 7,000 ft.

E 3309. Surcil, Darjeeling, 6,000 feet.

6. *P. martabanica*, Wall.; Hook. Fl. Ind. ii. 316; Kurz i. 434. Vern. *Thitmanku*, Burm.

No. B 1975, collected by Kurz in the Andamans in 1866, bears this name. It is a heavy, cross-grained, red wood, with moderate-sized pores, often subdivided, and fine, closely packed, uniform medullary rays.

## 2. PYGEUM, Gaertn.

No. 28, Adrian Mendis' Ceylon Collection, marked *Cryptocarya floribunda*, and *Galmorre*, Cingh., is a close-grained yellow wood with a structure resembling that of *Eriobotrya*. It is probably *Pygeum zeylanicum*, Gaertn.; Hook. Fl. Ind. ii. 321; Thwaites Enum. Fl. Zeyl. 102. Vern. *Galmora*, Cingh. (Weight 65 lbs. per cubic foot.) A large tree of South India and Ceylon, which gives a good firewood for burning bricks or lime: There are 8 other species of this genus. *P. acuminatum*, Colebr.; Hook. Fl. Ind. ii. 318; Kurz i. 435; Gamble 35, is a tree of the North-East Himalaya, Khasia Hills, Eastern Bengal and Chittagong, in which regions are also found *P. glaberrimum*, Hook. f.; and *P. montanum*, Hook. f. *P. Andersoni*, Hook. f., has been found on the summit of Parasnāth in Behar at 4,000 ft.; *P. Wightianum*, Bl. (*P. zeylanicum*, Beddome t. 59) and *P. Gardneri*, Hook. f., are large trees of South India; while *P. arboreum*, Endl., and two other species are found in the forests of Burma, chiefly in Tenasserim.

## 3. PRINSEPIA, Royle.

1. *P. utilis*, Royle; Hook. Fl. Ind. ii. 323; Brandis 196. Vern. *Bhekal*, *bekkra*, *karanga*, *cherara*, *dhatela*, *jhatela*, Hind.; *Gurinda*, Hazara; *Tatua*, *phulwara*, Rajaori; *Jinti*, Chenab; *Bekling*, Kanawar.

A deciduous, thorny shrub, with thin brown bark, peeling off in small vertical flakes. Sapwood white; heartwood red, very hard and compact, close and even grained, but much liable to split. Annual rings marked by a narrow continuous belt or line of larger pores; the pores outside this belt are small. The pores are sometimes filled with a white substance. Medullary rays very fine and numerous.

Outer Himalaya, from Hazara to Bhutan between 2,000 and 9,000 feet. Khasia Hills.

Growth slow, 12 rings per inch of radius. Weight, 69 lbs. per cubic foot. The

wood is only used for fuel and occasionally for walking sticks An oil is expressed from the seeds which is used for food and for burning

H 49 Nagkanda, Simla 8 000 feet  
H 2868 , ,

lbs  
69

#### 4 SPIRÆA, Linn

Contains 11 species found in the Himalaya chiefly at elevations above 6 000 feet They contain both herbs such as the Meadow Sweet found in Kashmir, and shrubs, few of which attain any size The two described are the most important

1. *S. sorbifolia*, Linn , Hook Fl Ind n 324 *S. Lindleyana*, DC  
Vern *Sarbashat*, *kikri*, *batu*, Pb

A shrub, with reddish grey bark Wood hard, compact, even grained Annual rings distinctly marked by a belt of more numerous pores Pores small, scanty in the outer part of each annual ring Medullary rays moderately broad

North West Himalaya from the Sutlej to Kumaun above 7 000 feet

Growth moderate 12 rings per inch of radius The largest growing species Recognised by its pinnate leaves from the other shrubby species It is chiefly found in shady damp woods

H 82 Simla 7 000 feet  
H 3014 Hattu Forest Simla 8 000 feet

lbs  
49  
---

2 *S. canescens*, Don , Hook Fl Ind n 325 Vern *Chaku*, *taku*,  
Simla

Structure similar to that of *S. sorbifolia*

North West Himalaya, from Murree to Kumaun

Growth moderate 12 rings per inch of radius Found chiefly on open hill sides as a stiff bush Very handsome in flower in the spring

H 159 Simla 7 000 feet  
H 2827 Mahasu Simla 8 000 feet

lbs  
47  
---

#### 5 RUBUS, Linn

Contains 40 species of erect trailing or climbing generally thorny shrubs Many species are known on account of their edible fruits the best of which is perhaps *R. ellipticus* *R. fruticosus*, Linn Hook Fl Ind n 337 Brandis 197 The Blackberry or Bramble Vern *Ankri*, *alish*, *lanachi*, *chench*, *palkhana* Pb is found



mens gave 13 rings. Average weight 41 lbs. per cubic foot, Mathieu Fl. For. p. 128, gives an average of 41.5 lbs. The wood has often a very handsome grain and deserves to be better known; it is scarcely ever used.

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H	22.	Matiyána, Simla, 7,000 feet	.	.	.	.	.	38
II	58.	Nagkanda, Simla, 8,000 feet	.	.	.	.	.	42
E	696.	Rangbúl Forest, Darjeeling, 7,000 feet	.	.	.	.	.	43
E	2369.	" " "	.	.	.	.	.	41
		" " "	.	.	.	.	.	42

The two Darjeeling specimens are perhaps *P. nepalensis*, Ser.; Hook. Fl. Ind. 316.

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A tree with thin dark bark. Wood reddish brown. Pores small, sometimes in groups or radial lines; medullary rays of two classes; numerous, very fine rays, alternating with fewer, short, broad ones.

Eastern Himalaya and Khasia Hills from 4,000 to 7,000 ft.

E 3309. Sureil, Darjeeling, 6,000 feet.

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## 3. PRINSEPIA, Royle.

1. *P. utilis*, Royle; Hook. Fl. Ind. ii. 323; Brandis 196. Vern. *Bhekal*, *bekkra*, *karanga*, *cherara*, *dhatela*, *jhatela*, Hind.; *Gurinda*, Hazara; *Tatúa*, *phulwara*, Rajaori; *Jinti*, Chenab; *Bekling*, Kanawar.

A deciduous, thorny shrub, with thin brown bark, peeling off in small vertical flakes. Sapwood white; heartwood red, very hard and compact, close and even grained, but much liable to split. Annual rings marked by a narrow continuous belt or line of larger pores; the pores outside this belt are small. The pores are sometimes filled with a white substance. Medullary rays very fine and numerous.

Outer Himalaya, from Hazara to Bhutan between 2,000 and 9,000 feet. Khasia Hills.

Growth slow, 12 rings per inch of radius. Weight, 69 lbs. per cubic foot. The

wood is only used for fuel and occasionally for walking sticks An oil is expressed from the seeds which is used for food and for burning

H 49 Nigkanda, Simla 8 000 feet  
H 2868

lbs  
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Vern *Sarbashtai*, *kikri*, *batu*, Pb

A shrub, with reddish grey bark Wood hard, compact, even grained Annual rings distinctly marked by a belt of more numerous pores Pores small, scanty in the outer part of each annual ring Medullary rays moderately broad

North West Himalaya from the Sutlej to Kumaun above 7 000 feet

Growth moderate 12 rings per inch of radius The largest growing species Recognised by its pinnate leaves from the other shrubby species It is chiefly found in shady damp woods

H 82 Simla 7 000 feet  
H 3014 Hattu Forest Simla 8 000 feet

lbs  
49  
---

2 *S. canescens*, Don , Hook Fl Ind ii 325 Vern *Chaku*, *taku*,  
Simla

Structure similar to that of *S. sorbifolia*

North West Himalaya from Murree to Kumaun

Growth moderate 12 rings per inch of radius Found chiefly on open hill sides as a stiff bush Very handsome in flower in the spring

H 159 Simla 7 000 feet  
H 2827 Mahasu Simla 8 000 feet

lbs  
47  
---

#### 5 RUBUS, Linn

fruit found in the  
doab and two other  
species but too small

and too numerous for mention here

1. *R. ellipticus*, Smith; Hook. Fl. Ind. ii. 336. *R. flavus*, Ham., Brandis 197; Kurz i. 438; Gamble 35. *R. Gowrecephul*, Roxb. Fl. Ind. ii. 517. Vern. *Akhi*, *ankri*, *kunáchi*, *guracha*, *pukana*, Ph.; *Esar*, *hishalu*, *hisalu*, Kumaun; *Tolu aselu*, *escalu*, *cesi*, Nep.; *Kashyem*, Lepcha.

A large thorny shrub with brown bark and moderately hard, light-brown wood. Pores small; medullary rays short, very broad and moderately broad.

Himalaya, from the Indus to Bhutan, between 1,500 and 8,000 feet; Khasia Hills and Assam.

The fruit is yellow and with the flavour of the raspberry; it is commonly eaten and made into preserves in the Himalaya, and is certainly one of the best of the wild fruits of India.

E 2367. Tukdah Forest, Darjeeling, 5,000 feet.

2. *R. lasiocarpus*, Smith; Hook. Fl. Ind. ii. 339; Brandis 198; Kurz i. 439; Gamble 36. Vern. *Gunacha*, *pukana*, Hazara; *Kandiári*, *kharmuch*, *sírgauch*, Kashmir; *Týlanch*, Chenab; *Niú*, *kalliachi*, Beas; *Klenchu*, *galka*, Simla; *Kalga*, Suttlej; *Kalawar*, *kała hisalu*, Kumaun; *Kala aselu*, Nep.; *Kajutalam*, Lepcha.

Bark smooth. Structure similar to that of *R. ellipticus*.

Himalaya, Khasia Hills, Burma, South India and Ceylon.

The fruit has a glaucous blue-black colour; it is small, but of good flavour.

E 2368. Tukdah Forest, Darjeeling, 5,000 feet.

3. *R. lineatus*, Reinw.; Hook. Fl. Ind. ii. 333; Gamble 36. Vern. *Gempé aselu*, Nep.

A large thornless shrub with red bark peeling off in papery flakes. Wood yellowish brown, in structure resembling that of *R. ellipticus*.

Sikkim Himalaya, 6,000 to 9,000 feet.

Stems used to make fences. Fruit red, edible.

E 3307. Darjeeling 7,000 feet.

## 6. ROSA, Linn.

Contains 9 species without including those cultivated in India, full account of which is given in Brandis' Forest Flora, and referred to in the Flora Indica ii. 363. *Rosa involucrata*, Roxb. Fl. Ind. ii. 513, is a sub-scandent shrub of the banks of streams in the Gangetic plain, westward to Mount Aboo and eastward to Burma. *R. Eglanteria*, Linn.; Hook. Fl. Ind. ii. 366 (*R. lutea*, Mill.; Brandis 201), is a shrub of the arid parts of the inner Himalaya, with yellow flowers. *R. Webbiana*, Wall; Hook. Fl. Ind. ii. 366; Brandis 202. Vern. *Kantián*, *shingári*, Hazara; *Shikand*, *shawali*, *manayar*, *brazen*, Chenab; *Ohúa*, Lahoul; *Sia*, Ladak, Piti; *Ringyal*, Kanawar, is a pink-flowered erect shrub of the same region. *R. anserinaefolia*, Boiss.; Hook. Fl. Ind. ii. 365, is a common, wild and cultivated, white-flowered rose of Afghanistan. *R. longicuspis*, Bertol.; Hook. Fl. Ind. ii. 367, is a climber of the Khasia Hills from 2,000 to 5,000 feet; and *R. Leschenaultiana*, W. and A.; Hook. Fl. Ind. ii. 368, a climber of the Nilgiri and Pulney Hills.

1. *R. moschata*, Mill.; Hook. Fl. Ind. ii. 367; Brandis 201. Vern. *Kuji*, *kajei*, *karer*, *kwia*, *kwiala*, Hind.; *Phulwara*, *chal*, Kashmir.

A large, thorny, climbing shrub. Bark greyish brown. Wood moderately hard, porous. Annual rings marked by a continuous line of large pores in the spring wood, the pores in the autumn wood being scanty and small. Medullary rays broad to very broad.

North-West Himalaya, from Afghanistan to Nepal, ascending to 11,000 feet.

A tall climber, very sweet scented, and very ornamental when in flower in May and June. Flowers white. Growth slow, 15 rings per inch of radius.

H 115. Bhajji, Simla, 5,000 feet.

2. *R. sericea*, Lindl.; Hook. Fl. Ind. ii. 367; Brandis 202; Gamble 36.

A thorny shrub with greyish brown bark, peeling off in papery flakes. Wood very hard, darkening on exposure. Annual rings marked by a continuous line of very small pores in the spring wood, the pores in the autumn-wood being extremely small. Medullary rays short, moderately broad to broad, prominent.

Himalaya, from the Sutlej to Bhutan, from 9,000 to 14,000 feet.

Growth slow, 18 rings per inch of radius. Flowers white or pink.

E 2366. Suburkum, Darjeeling, 11,000 feet.

3. *R. macrophylla*, Lindl.; Hook. Fl. Ind. ii. 366; Brandis 203.

Vern. *Guláb, ban-guláb*, Hind.; *Tikjik*, Chenab; *Akhiari*, Ravi; *Breri, bankoi*, Simla.

A thorny shrub. Bark blackish brown, peeling off in thin flakes. Wood hard and compact; annual rings marked by a belt of numerous small pores in the spring wood; pores in the rest of the wood extremely small. Medullary rays moderately broad to broad, prominent.

Himalaya, from the Indus to Sikkim, between 2,500 and 10,000 feet.

pin									Flowers
H 50.	Nagkanda, Simla, 8,000 feet	.	.	.	.	.	.	.	lbs.
H 2872.	" "	.	.	.	.	.	.	.	55
H 2847.	Mahasu, Simla "	.	.	.	.	.	.	.	69

## 7. ERIOBOTRYA, Lindl.

Contains 9 species. *E. japonica*, Lindl.; Hook. Fl. Ind. ii. 372; Brandis 575

are shrubs or small trees.

1. *E. dubia*, Dene; Hook. Fl. Ind. ii. 371. *Photinia dubia*, Lindl. Gamble 37. Vern. *Berkung*, Lepcha.

A small tree. Bark light brown,  $\frac{1}{2}$  inch thick. Wood white, soft, even grained. Pores very small. Medullary rays of two classes, numerous very fine rays closely packed between fewer moderately broad rays.

North-East Himalaya, from 5,000 to 6,000 feet.

Weight, 46 lbs. per cubic foot.

E 2365. Rangbúl, Darjeeling, 7,000 feet.

2. *E. elliptica*, Lindl.; Hook. Fl. Ind. ii. 372. *Photinia sp.* Gamble 37. Vern. *Mihul, mya*, Nep.; *Yelago*, Lepcha.

A moderate-sized evergreen tree. Bark greyish brown,  $\frac{1}{2}$  inch thick. Wood reddish brown, compact, hard, apt to warp slightly. Pores small and very small. Medullary rays fine and very fine, very numerous, prominent on a radial section.

Sikkim and Bhutan Himalaya, from 6,500 to 8,000 feet.

Growth moderate. Aikin, describing Wallich's specimens gives 8·4 rings; our specimens shew 10 rings per inch of radius. Weight, 57·5 lbs. per cubic foot. Wood good, but not used.

E 366.	Rangbúl, Darjeeling, 7,000 feet	.	.	.	.	.	lbs.
E 3109.	Darjeeling, 7,000 feet	.	.	.	.	.	58
							57

## 8. PYRUS, Linn.

Contains 22 species, all found in the Himalaya and Khasia Hills, one only extending southward to Burma. The genus is divided into 5 sections: *Malus*, 3 species; *Pyrus*, 4 species; *Aria*, 2 species; *Sorbus*, 5 species; and *Micromelus*, 8 species.

In the section *Malus*, besides *P. baccata*, Linn., *P. Malus*, Linn.; Hook. Fl. Ind. ii. 373; Roxb. Fl. Ind. ii. 511; Brandis 205. The Apple. Vern. *Shewa*, Afg.; *Shu, sun, chünt, khajir, bisir, palu*, Pb.; *Kúshú*, Ladak; *Seo, seb*, Hind., is apparently wild and commonly cultivated in the North-West Himalaya. It is also cultivated in gardens in Berar, Central India, the Punjab and Sind. *P. sikkimensis*, Hook. f.; Hook. Fl. Ind. ii. 373, is found in the Sikkim Himalaya.

In the section *Pyrus*, besides *P. Pashia*, Ham., *P. communis*, Linn.; Hook. Fl. Ind. ii. 374; Roxb. Fl. Ind. ii. 510; Brandis 203. The Pear. Vern. *Tang, batang, nák, bo, sunkeint, charkeint, lí*, Pb. Hills; *Náshpáti, nák*, Pb. Plains; *Amrúd*, Arab. is apparently wild in Kashmir and cultivated in the Himalaya. The fruit is generally hard, but good for baking and preserves. *P. Kumaoni*, Dene; Hook. Fl. Ind. ii. 374; Brandis 204, and *P. Jacquemontiana*, Dene; Hook. Fl. Ind. ii. 374; Brandis 205, are found in the North-West Himalaya; they much resemble *P. Pashia*.

In the section *Aria*, two species only occur; they are here described.

In the section *Sorbus*, besides *P. foliolosa*, *P. Aucuparia*, Gaertn.; Hook. Fl. Ind. ii. 375, the Mountain Ash, is found in the North-West Himalaya from 11,500 feet to 13,000 feet from Kashmir to Kumaun; and *P. microphylla*, Wall., *P. Wallichii*, Hook. f., and *P. insignis*, Hook. f., in the Sikkim Himalaya.

In the section *Micromelus*, *P. Griffithii*, Dene.; *P. rhamnoides*, Dene; and *P. Thomsoni*, King, are described from high elevations in the Sikkim Himalaya; *P. ferruginea*, Hook. f., from Bhutan; and 4 species: *P. khasiana*, Dene, *P. granulosa*, Bertol. (Vern. *Dingsopha*, Khasia), *P. polycarpa*, Hook. f., and *P. cuspidata*, Bertol., from the Khasia Hills.

Wood compact and close-grained, marked by very small pores and fine medullary rays. The wood of the Pears (sections *Pyrus* and *Malus*) warps and cracks, whereas that of the sections *Sorbus* and *Aria* seasons better.

1. *P. baccata*, Linn.; Hook. Fl. Ind. ii. 373; Brandis 205. The Siberian Crab. Vern. *Ban mehal, gwálam*, Hind.; *Baror, líú, lhijo, líwar*, Pb.

A small tree with grey bark. Wood white, with pale-brown heart-wood, warps considerably. Structure similar to that of *P. Pashia*, but medullary rays slightly broader.

Himalaya, from the Indus to Bhutan, between 6,000 and 11,000 feet; Khasia Hills.

Growth slow, 12 rings per inch of radius. Weight, 53 lbs. per cubic foot. Fruit edible.

E 967.	Chumbi Valley, Tibet, about 10,000 feet	.	.	.	.	lbs.
						53

2. *P. Pashia*, Ham.; Hook. Fl. Ind. ii. 374; Kurz i. 441. *P. variolosa*, Wall.; Brandis 204, 575; Gamble 36. Vern. *Tang, batangi, keint, shindar, katári, kítku, ku, shegul*, Pb.; *Mehál, mol*, Hind.; *Passi*, Nep.; *Lí*, Lepcha.

A moderate-sized deciduous tree. Bark dark brown, exfoliating in

small rectangular scales Heartwood light reddish brown, hard, close and even-grained, cracks and warps Annual rings marked by a dark line Pores very small Medullary rays very fine and very numerous, uniform and equidistant

The  
The

lbs

H 3185 Dungagalli Hazara 7 000 feet

H 23 Madhan Simla 6 000 feet

H 236 Garhwal Hills (1868)

47

3 *P. lanata*, Don, Hook Fl Ind n 375 *P. Aria*, Ehrh, Brandis 206 Vern *Gun palos*, Afg, *Doda, chola, chilana, maila, pallu, ban pala, langhi, thanki, morphal, mirpol*, Pb, *Galion, mauli, pallu, bin palli*, Hind

A moderate sized deciduous tree with dark-brown bark Wood white, moderately hard, close and even-grained, seasons well Annual rings marked by a narrow belt without pores, on the outside of each ring Pores very small, most numerous in the spring wood Medullary rays fine.

Himalaya

Growth sl

gives 46 to 56

and even grain

Medlar (*P. germanica* Ldl)

lbs

H 61 Nagkanda, Simla 8 000 feet

H 2887 Nagkanda Simla, 8 000 feet

H 3186 Dungagalli, Hazara, 7 000 feet

47

40

4. *P. vestita*, Wall, Hook Fl Ind n 375 *P. lanata*, Don, Gamble 37 Vern *Mayhell, gúhor*, Nep, *Singla*, Bhutia

A deciduous tree Wood reddish with brown streaks, moderately hard Annual rings distinct Pores very small Medullary rays fine, numerous, not distinct

Eastern Himalaya between 8 000 and 10 000 feet

Growth slow, 20 rings per inch of radius Weight 41 lbs per cubic foot Fruit edible

lbs

E 380 Tonglo, Darjeeling 10,000 feet

41

5. *P. foliolosa*, Wall, Hook Fl Ind n. 376, Brandis 207, Gamble 37. Vern *Akarsani*, Nep

A shrub or small tree Wood white, with small, darker coloured heart-wood Annual rings distinct Pores very small, more numerous in the spring wood Medullary rays fine, very numerous

Eastern Himalaya between 7,000 and 10 000 feet

Growth slow, 23 rings per inch of radius Weight, 45 lbs per cubic foot

lbs

E 378 Tonglo Darjeeling 10 000 feet

45

6 *P. ursina*, Wall, Brandis 206 *P. foliolosa*, Wall; Hook Fl Ind n 376 (in part) Vern *Selia, kúlia*, Pb, *Hampi lu*

A small tree with smooth, reddish grey bark, peeling off in horizontal papery strips. Wood white, with a small, brown heartwood. Structure similar to that of *P. foliolosa*.

Himalaya, from the Indus to Sikkim, between 6,000 and 12,000 feet.

Growth slow, 32 rings per inch of radius. Weight, 54 lbs. per cubic foot.

II 134.	Lahoul, 10,000 feet	.	.	.	.	.	.	.	lbs.
II 3020.	Hattu, Simla, 10,000 feet	.	.	.	.	.	.	.	54

## 9. STRANVÆSIA, Lindl.

1. *S. glaucescens*, Lindl.; Hook. Fl. Ind. ii. 382; Brandis 210. Vern. *Garmchal*, *súnd*, Kumaun.

A small evergreen tree. Bark  $\frac{1}{2}$  inch thick, rough, dark coloured. Wood light coloured when fresh cut, turning reddish brown on exposure, fine and even grained; annual rings marked by a thin line. Pores very small, numerous. Medullary rays numerous, uniform, very fine, equidistant.

Central Himalaya, Kumaun and Garhwal from 3,000 to 8,000 feet, Nepal, Khasia Hills.

Growth moderate, 7 rings per inch of radius. Weight, 48 lbs. per cubic foot.

II 2970.	Naini Tál, 6,000 feet	.	.	.	.	.	.	.	lbs.
									48

## 10. CRATÆGUS, Linn.

Contains 3 species. *C. Oxyacantha*, Linn.; Hook. Fl. Ind. ii. 383; Brandis 207; Gamble 37. The Hawthorn. Vern. *Ring*, *ramnia*, *pingyat*, *phindák*, *patakhan*, Pb.; *Ban-sanjli*, *sír sinjli*, Jhelam, is a small tree of Afghanistan and the Western Himalaya, from the Indus to the Ravi; elsewhere cultivated. *C. Clarkei*, Hook. f.; Hook. Fl. Ind. ii. 383, is a small tree of Kashmir.

1. *C. crenulata*, Roxb. Fl. Ind. ii. 509; Hook. Fl. Ind. ii. 384. *C. Pyracantha*, Persoon; Brandis 208. Vern. *Gingarú*, *gianru*, Hind.

A large spinescent shrub. Wood white, hard, very close and even grained. Annual rings marked by a belt of harder and darker-coloured wood on the outer edge of each ring. Pores very small, numerous. Medullary rays very fine, numerous.

Himalaya, from the Sutlej to Bhutan, from 5,000 to 7,000 feet, descending in Kumaun to 2,500 feet.

H 2967.	Naini Tál	.	.	.	.	.	.	.	lbs.
									48

## 11. COTONEASTER, Linn.

Contains 10 or 11 species, many of which are merely small prostrate shrubs. They are all Himalayan, one only extending to the Nilgiris and one (doubtfully) to the Khasia Hills. *C. frigida*, Wall.; Hook. Fl. Ind. ii. 385; Brandis 209, is a small tree of the Central and Eastern Himalaya. *C. buxifolia*, Wall.; Hook. Fl. Ind. ii. 387; Beddome xvii.; Brandis 210. Vern. *Hírúmay*, Nilgiris, is a rigid shrub or small tree of the Nilgiri and Pulney Hills, with a dense elastic wood used by the Todas to make clubs. The remaining species not here described are all small.

Wood harder and more compact than that of *Pyrus*; also marked by extremely small pores.

1. *C. bacillaris*, Wall., Hook Fl Ind n. 384; Brandis 208 Vern. *Rí, rin, lin, lún, ráu, reúsh, rish*, Pb. Hills; *Ruinsh*, Jannar Bawur.

A small deciduous tree with bluish grey, nearly smooth bark. Wood white, turning light red towards the centre, smooth, very hard, close and even grained, but splits and waips much. Annual rings marked by the darker colour of the outer portion of each ring. Pores extremely small, uniformly distributed. Medullary rays very fine, very numerous.

Salt Range above 1,500 feet, North West Himalaya, from the Indus to the Sarda, between 5,000 and 10,000 feet, Sikkim and Bhutan

ht, on an average, 57 lbs per the "alpenstocks" sold at

		lbs
H 55	Nagkanda, Simla, 8,000 feet	61
H 2890		
H 26	Madhan, Simla, 6,000 feet	58
H 121	Kulu, about 7,000 feet	52
H 925	Hazara	56
H 3177	Dungagalli, Hazara, 7,000 feet	...

2. *C. acuminata*, Lindl., Hook Fl. Ind. n. 385, Brandis 209 Vern. *Ríú, ráuns, riús, ruinsh*, Hind

A deciduous shrub. Wood hard, structure like that of *C. bacillaris*.

ht. on an average, 57 lbs per the "alpenstocks" sold at

		lbs
H 120	Jalaori Pass, Kulu, 9,000 feet	51
H 2889		
H 3013	Nagkanda, Simla, 8,000 feet	

3. *C. microphylla*, Wall.; Hook. Fl Ind. n. 387, Brandis 209, Gamble 37. Vern. *Khárit, lúni*, Kashmir, *Garrí*, Kumraun

A small procumbent shrub. Wood hard, similar to that of *C. bacillaris*, but with slightly larger pores

Himalaya, from Kashmir to Bhutan, from 4,000 to 8,000 feet in the North-West and above 10,000 feet in Sikkim. Often planted for ornament in England

Growth slow, 24 rings per inch of radius

H 2823 Simla, 7,000 feet.

## ORDER XLII. SAXIFRAGÆÆ.

An Order of about 8 Indian arborescent genera, chiefly Himalayan. It is divided into 3 tribes of woody plants, viz.—

Tribe I—Hydrangeæ	<i>Hydrangea, Pileostegia, Dichroa, Deutzia and Philadelphus</i>
II—Escalloniæ	<i>Itea and Polyosma</i>
III—Ribesiæ	<i>Ribes</i>

Five of these genera are here described *Pileostegia viburnoides*, Hook. f. and

... ..



between 3,000 and 6,000 feet. *I. macrophylla*, Wall.; Hook. Fl. Ind. ii. 408; Gamble 38. Vern. *Teturidumm*, Lepcha is a small tree of the valleys round Darjeeling and in the Khasia Hills. *I. Chinensis*, Hook. and Arn.; Hook. Fl. Ind. ii. 408, is a small tree of the Khasia Hills between 4,000 and 6,000 feet. *Polyosma integrifolia*, Bl.; Hook. Fl. Ind. ii. 409. (*P. Wallichii*, Bennett; Kurz 444) is a small tree of the Khasia Hills, found also in the Andaman Islands.

Pores small to extremely small. Medullary rays often of two classes, moderately broad and very fine.

## 1. HYDRANGÆA, Linn.

Contains 5 Indian species. Besides those described, the chief is *H. altissima*, Wall.; Brandis 211; Gamble 38. Vern. *Sema*, Lepcha, a large climbing or erect shrub of the Himalaya from the Sutlej to Bhutan above 5,000 feet; its bark is used as a substitute for paper. *H. aspera*, Don, and *H. stylosa*, Hook. f. and Th., are small trees of the Sikkim Himalaya. The Garden Hydrangea, or Chinese Guelder Rose, so commonly cultivated as an ornamental shrub in the Hills, is *H. Hortensia*, DC.

1. *H. vestita*, Wall.; Hook. Fl. Ind. ii. 405; Brandis 211; Gamble 38. Vern. *Kulain*, Bhutia; *Pokuttia*, Nep.

A small deciduous tree with light brown, rather corky bark. Wood pinkish white, moderately hard; annual rings indistinct. Pores extremely small. Medullary rays very fine.

Himalaya, from Kumaun to Sikkim between 5,000 and 11,000 feet.  
Weight, 45 lbs. per cubic foot.

E 373. Tonglo, Darjeeling, 10,000 feet . . . . .	lbs. 45
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2. *H. robusta*, Hook. f. and Th.; Hook. Fl. Ind. ii. 404; Gamble 38. Vern. *Bogoti*, Nep.

A small, handsome, deciduous tree, with thin, brown, papery bark, peeling off in large flakes. Wood white, moderately hard, close-grained. Pores very small. Medullary rays of two sizes, moderately broad, short and very fine, prominent.

Eastern Himalaya, Sikkim, from 5,000 to 7,000 feet, generally as undergrowth in the oak forests.

Weight, 42 lbs. per cubic foot.

E 2370. Rangbúl, Darjeeling, 7,000 feet . . . . .	lbs. 42
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## 2. DICHROA, Lour.

1. *D. febrifuga*, Lour.; Hook. Fl. Ind. ii. 406; Gamble 38. *Adamia cyanea*, Wall. t. 213. Vern. *Basak*, *bansúk*, Nep.; *Gebokanak*, Lepcha; *Singnamúk*, Bhutia.

An evergreen shrub, with yellow bark peeling off in flakes. Wood white, moderately hard, with small pores and moderately broad to very fine medullary rays.

Common in the forests of the Eastern Himalaya, from Nepal to Bhutan and in the Khasia Hills, above 4,000 feet.

The shoots and bark of the roots are made into a decoction and used as a febrifuge by the Nepalese. It is a very handsome shrub, with blue flowers and bright blue berries, coming up on clearings in the oak forests.

E 2371. Darjeeling, 7,000 feet . . . . .	lbs. 41
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## 3. DEUTZIA, Thunb.

Contains 3 species *D. macrantha*, Hook. f and Th. is a shrub of the Kumaun Hills above 5,500 feet

1. *D. corymbosa*, Brown; Hook. Fl. Ind. ii. 406; Brandis 212 Vern. *Dalouchi*, *deutsch*, *bhuyru*, Simla

A shrub. Outer bark yellowish grey, peeling off in long thin papery rolls, leaving the smooth, thin, greenish brown inner bark exposed. Wood, white, soft, even-grained. Pores small, very numerous. Medullary rays moderately broad, alternating with numerous very fine rays.

Himalaya, from the Sutlej to Bhutan, from 6,000 to 10,000 feet

H 2850. Mahasu, Simla, 7,000 feet lbs 46

H 2898 Nagkanda, Simla, 8,000 feet . . . . .

2. *D. staminea*, Brown; Hook. Fl. Ind. ii. 407; Brandis 212. Vern. *Muneti*, Kumaun; *Deutsch*, Simla.

A shrub. Bark grey, soft, peeling off in small strips, but to a less degree than in *D. corymbosa*. Wood white, soft, structure similar to that of *D. corymbosa*.

Himalaya, from Kashmir to Bhutan, from 5,000 to 8,000 feet

H 2836 } Simla, 6,000 feet lbs 43

H 2819. } . . . . .

## 4 PHILADELPHUS, Linn.

1. *P. coronarius*, Linn., Hook. Fl. Ind. ii. 107, Brandis 212. Vern. *Dalouchi*, *bhoj*, Simla.

A shrub with soft, light grey bark. Wood soft, white, with large pith. Pores small and very small, more numerous near the inner edge of each annual ring. Medullary rays of two classes, very fine and moderately broad. The structure of the wood of the Indian shrub is the same as that of the European shrub, the "Syringa" of gardens.

Himalaya, from Kishtwar to Sikkim, from 6,000 to 10,000 feet Often planted for ornament

H 3038 Nagkanda, Simla, 7,000 feet lbs 41

## 5. RIBES, Linn.

Inner Himalaya. *R. desmocarpon*, Hook. f. and Th., *R. luridum*, Hook. f. and Th., and *R. Griffithii*, Hook. f. and Th. are all shrubs of the Sikkim and Bhutan Himalaya.

1. *R. glaciale*, Wall.; Hook. Fl. Ind. ii. 110; Vern. *Ribhaya*, Bhutia.

A small shrub with shining bark, peeling off in papery flakes. Wood white, compact, moderately hard. Pores extremely small, in narrow interrupted wavy, concentric lines. Medullary rays scanty, short, broad and very broad.

Himalaya, from Kashmir to Bhutan, between 7,000 and 11,000 feet.  
Weight, 58 to 63lbs.

H 3021.	H 3022.	Hattu, Simla, 10,000 feet	.	.	.	.	.	lbs.
H 2908.	H 2912.	Nagkanda, Simla, 9,000 feet	.	.	.	.	.	63
H 3025.	Matiyāna, Simla, 9,000 feet	.	.	.	.	.	.	...
E 973.	Chumbi Valley, Tibet, about 10,000 feet	.	.	.	.	.	.	...
			.	.	.	.	.	58

### ORDER XLIII. HAMAMELIDEÆ.

Contains 7 genera of Indian trees or shrubs. *Distylium indicum*, Bth., *Sycopsis Griffithiana*, Oliv., and *Loropetalum chinense*, Oliv., are all shrubs of the Khasia Hills; while *Corylopsis himalayana*, Griff.; Hook. Fl. Ind. ii. 427, is found in the Eastern Himalaya and Khasia Hills, between 5,000 and 6,000 feet. *Liquidambar orientale*, Miller, a tree of Asia Minor, yields the fragrant resin "Storax" used in medicine.

Wood close-grained. Pores small and very small, numerous and uniformly distributed. Medullary rays numerous, fine and very fine.

#### 1. PARROTIA, C. A. Meyer.

Besides the species described, *P. persica*, C. A. Meyer, is a shrub of the low forests on the south coast of the Caspian Sea.

1. *P. Jacquemontiana*, Decaisne; Hook. Fl. Ind. ii. 426; Brandis 216. Vern. *Pāser*, *peshora*, *po*, *kilār*, *kirru*, Punjab.

A large deciduous shrub or small tree, with thin, grey bark. Wood light pinkish red, hard, heavy, very close-grained. Pores extremely small. Medullary rays fine, numerous.

North-West Himalaya from the Indus to the Ravi, between 2,800 and 8,500 feet. Growth slow 12 to 16 rings per inch (*Brandis*). Weight, 56 lbs. per cubic foot. Wood highly esteemed for walking-sticks, tent pegs, charpoys and rice pestles, also for native bows for throwing pellets. But its chief use is in basket-work and in the making of bridges over the Himalayan rivers. The twigs are very tough and flexible, and are twisted together into thick ropes, often 300 feet long. The bridges consist of one large rope to walk on and two smaller side ropes, one for each hand, with smaller ropes connecting the hand ropes with the foot rope. (P 1000 was a fine specimen sent to the Paris Exhibition of 1878 from the Ravi.)

H 3178.	Dungagalli, Hazara, 6,000 feet	.	.	.	.	.	.	lbs.
H 933.	Hazara, Punjab, 6,000 feet	.	.	.	.	.	.	56
H 905.	Upper Chenab, Punjab	.	.	.	.	.	.	...

#### 2. BUCKLANDIA, R. Brown.

1. *B. populnea*, R. Br.; Hook. Fl. Ind. ii. 429; Kurz i. 445; Gamble 38. Vern. *Pipli*, Nep.; *Singliang*, Lepcha; *Dingdah*, Khasia.

Eastern Himalaya Khasia Hills and hills of Martaban from 800 to 900 feet. Growth moderately fast, 6 to 7 rings per inch of radius. Weight, on an average, 45 lbs per cubic foot. Is very much used in Darjeeling for planking and door and window frames, and is in great demand. It is a very ornamental tree with ash poplar like leaves, and thick fleshy stipules. It is easily grown from seed but the young plants are rather delicate.

E 699	Sapodara Forest, Darjeeling	5 500 feet	41
E 2372	Rangbul , ,	7 000 "	41
E 2373	" , ,	" , "	42

1. *A. excelsa*, Noronha, Hook Fl Ind n 429, Kurz: 116 Vern.  
*Julu, Ass., Nantayop, Burm*

A lofty deciduous tree. Bark smooth, light grey, exfoliating in large thin flakes. Wood soft, reddish grey with lighter streaks. Annual rings marked by a narrow belt of firm wood without pores. Pores small, uniform and uniformly distributed in lines between the medullary rays. Medullary rays fine, equidistant, prominent on a radial section.

Growth moderate 6 rings per in h of radius Weight 46 lbs per cubic foot  
Wood used in Assam for building and ordinary domestic purposes

F 1269	Lakhimpur Assam				40
B 2701	Brought from Tirov by Dr Wallich in 1828	Resembles this			19
	in structure				

Contains seven Indian genera of trees chiefly coastal plants and known by the common name of Mangroves. They form forests but grow together the most in the estuaries of the Indus, Ganges and Irrawaddy as well as along the coasts of Malabar, Assam, Tenasserim and the Andaman Islands. The Order is divided into 2 Tribes, viz.

Tribe I—Rhizophoraceae

. II —Legnotidae

2212 71 rd, Corl pa, h 11 lctia  
 m 33rv 1 rd  
 6 wallia, thjn l1 rd on Wallia  
 m 33rd 71 rd 11 l1

*Blapharistemma cosumelense* W. H. H. 11 7 1  
small tree of the hills  
In 11 110, 1112 1 1  
Bull, No 1 11 11 1  
The remaining genera

*Rhizophora*, *Cerops* and *Bruguiera* have small pores on the fine or moderately broad rays. The rays are continuous & interrupted concentric bands. The rays of *Leptocarpus*, *Carallia* and *Dist. phylla* differ in having small pores on numerous very fine rays between the rays of the rays.



An evergreen shrub or small tree Wood soft, close-grained Pores very small, very numerous Medullary rays very short, moderately broad, prominently marked on a radial section, the distance between the medullary rays being many times broader than the transverse diameter of the pores.

Muddy shores and tidal creeks of Bengal Burma, and the Western Coast

Weight, 38 lbs per cubic foot Wood used only for firewood Bark used in Tavoy in dyeing red probably as a mordant

E 407 Sundarbans

lbs  
38

#### 4 BRUGUIERA, Lam

Contains five species *B eriopetala* W and A *B malabarica* Arn *B caryophylloides* and *B parviflora* W and A are all trees of the shores of Malabar Bengal Arracan Tenasserim and the Andaman the last species being also found at Masulipatam on the Coromandel Coast, and in the Sundarbans

1. *B gymnorhiza*, Lam, Hook Fl Ind ii 437, Brandis 210, Kurz i 450 *B Rheedii*, Bl, Beddome c *Rhizophora gymnorhiza*, Roxb Fl Ind ii 460 Vern *kakra*, *kankra*, Beng, *Byoo bo*, Burm

An evergreen tree, heartwood small, red, extremely hard Pores small, oval, and subdivided, medullary rays moderately broad, fine, very numerous

Muddy shores and tidal creeks of India, Burma and the Andaman Islands.

Weight, 54 lbs per cubic foot The wood is used for firewood house posts, planks and articles of native furniture

E 412 Sundarbans

lbs  
54

B 2217 (62 lbs) and B 2222 (60 lbs) are specimens which were received in 1866 from the Andamans under the respective names of *Garcinia* and *Mallotus* but they are probably the wood of another species of *Bruguiera* The pores are moderate sized oval and subdivided and the medullary rays are moderately broad and fine nearly equidistant and prominent on a radial section The pores are joined by narrow, interrupted, concentric lines

#### 5 CARALLIA, Roxb

Contains two Indian trees *C lanceaefolia* Roxb Fl Ind ii 431, Hook Fl Ind ii 439 is an evergreen tree of the forests of Upper Tenasserim

Ind i 439, Beddome t 103, oxb Fl Ind ii 431, Kurz i Nep, *Kajitakra*, Ass, *Karalli*, *Dawata*, Cingh., *Bya*, Arracan, *Manioga*, Burm

An evergreen tree with thin, dark-grey bark Sapwood perishable, heartwood red, very hard, durable, works and polishes well Pores moderate sized to large, often subdivided Medullary rays long, of two classes, extremely broad and fine, numerous fine rays between each pair of broad one, marked on a radial section as broad, irregular, shining plates Fine lines of soft tissue across the rays.

Eastern and Western moist zones, Eastern Himalaya, Bengal, Burma, South India and the Andamans.

Weight, according to Benson and Skinner, No. 37, 44 lbs.; A. Mendis, 42 lbs.; Brandis' Burma List, 1862, No. 106, 60 lbs.; our specimens give an average of 47 lbs. Benson's experiments with bars 3 feet  $\times$  1'4 inch  $\times$  1'4 inch, gave  $P = 797$ ; Skinner gives  $P = 656$ .

Wood used in South Kanara for furniture and cabinet-making and in Burma for planking, furniture and rice-pounders.

		lbs.
W 743.	South Kanara . . . . .	42
B 308.	Burma (1867) . . . . .	47
B 816.	Burma . . . . .	51
B 2530.	Burma (1862) . . . . .	47
B 2210.	Andaman Islands (1866) . . . . .	47
B 1500.	Burma . . . . .	...
No. 19.	Ceylon Collection (marked <i>C. zeylanica</i> ) . . . . .	42

2. No. 90. Adrian Mendis, Ceylon Collection, weight 51 lbs.  $P = 464$ . Vern. *Ukbeiriye*, Cingh., is probably *C. calycina*, Bth.; Thwaites Enum. 121; Hook. Fl. Ind. ii. 439. The wood is brick-red; in structure it resembles that of *C. integerrima*, but the pores are fewer, and the broad rays are narrower and at regular distances.

## 6. ANISOPHYLLEA, Br.

1. *A. zeylanica*, Bth.; Hook. Fl. Ind. ii. 442; Thw. Enum. 119; Beddome t. 195. *Tetracrypta cinnamomoides*, Gard. and Ch. Vern. *Wellipiyanne*, Cingh.

A tree. Wood greyish brown, moderately hard. Pores moderate-sized and large, filled with a white substance, prominent on a vertical section as white streaks. Medullary rays of two classes, numerous but indistinct, fine, between fewer moderately broad rays. Bars of soft texture and the same width as the rays crossing these and dividing the wood into numerous rectangular unequal figures.

No. 96.	Ceylon Collection . . . . .	lbs. 35
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## ORDER XLV. COMBRETACEÆ.

An Order containing 8 Indian Genera of trees, shrubs or climbers, containing some of the most important of the timber trees of the Indian forests. It is divided into 2 Tribes:—

- Tribe I.—Combretæ . . . . . *Terminalia*, *Calycopteris*, *Anogeissus*, *Lumnitzera*, *Combretum* and *Quisqualis*.  
 „ II.—Gyrocarpeæ . . . . . *Illigera* and *Gyrocarpus*.

Four of these genera are here described, most of the remainder contain climbing shrubs. *Lumnitzera* contains two small evergreen trees. *L. racemosa*, Willd.; Hook. Fl. Ind. ii. 452; Beddome ciii.; Brandis 221; Kurz i. 468 (*Petaloma alternifolia*, Roxb. Fl. Ind. ii. 372) Vern. *Kripa*, *Kirpa*, Beng.; *Baireya*, Cingh.; *Yengyé*, Burm., is a tree of the muddy creeks and tidal forests of the Sundarbans, Malabar, Arracan, Tenasserim and the Andamans, also found by Beddome at Balasore. It has a strong and durable wood used for house-posts, and in Calcutta for fuel (Roxburgh). *L. coccinea*,

W and A Hook Fl Ind ii 452 (L list mangrove swamps of Tenasserim Com cl mb ng found in the moist zones of India C decandrum Roxb Fl Ind ii 232

460 Gamble 40 Vern *Punk pharsia*

Lepcha, *Arikota* Tel *Thama la nway* Burm an evergreen scandent shrub with whitish yellow floral leaves climbing to the summits of the highest trees and found in the intermediate and moist zones of India and Burma It has a whitish grey bark and soft light-brown wood having large pores and moderate sized evenly distributed medullary rays (E 3301 Darjeeling Terai) *Quisqualis indica* Roxb Fl Ind i 427 is the Rangoon Creeper Vern *Dawakmine* Burm a climbing shrub with red flowers indigenous in Tenasserim and cultivated in gardens in other parts of India

*Illigera* contains 3 species *I Coryadenia* Meisn Hook Fl Ind ii 460 (*I appendiculata* Bl Kurz 469) of Tenasserim and the Andamans *I Kur* ii C B Clarke of Burma and the Khasia Hills and *I khasiana* C B Clarke of the Khasia Hills all sea side shrubs

Wood moderately hard to very hard, with a distinct dark coloured heartwood in some, but not in all species Pores varying in size Medullary rays uniform, equidistant, fine or very fine very numerous, the distance between the rays less than the diameter of the pores The wood of *Gyrocarpus* is anomalous

## 1 TERMINALIA, Linn

Cont  
timber as

per cubic foot

15 - 20 - 30 - 40 - 50 - 60 - 70 - 80 - 90 - 100 - 110 - 120 - 130 - 140 - 150 - 160 - 170 - 180 - 190 - 200 - 210 - 220 - 230 - 240 - 250 - 260 - 270 - 280 - 290 - 300 - 310 - 320 - 330 - 340 - 350 - 360 - 370 - 380 - 390 - 400 - 410 - 420 - 430 - 440 - 450 - 460 - 470 - 480 - 490 - 500 - 510 - 520 - 530 - 540 - 550 - 560 - 570 - 580 - 590 - 600 - 610 - 620 - 630 - 640 - 650 - 660 - 670 - 680 - 690 - 700 - 710 - 720 - 730 - 740 - 750 - 760 - 770 - 780 - 790 - 800 - 810 - 820 - 830 - 840 - 850 - 860 - 870 - 880 - 890 - 900 - 910 - 920 - 930 - 940 - 950 - 960 - 970 - 980 - 990 - 1000

Wood moderately hard to very hard A distinct, dark coloured, very hard heartwood in *T tomentosa*, *Arguna*, *myriocarpa*, and *paniculata*, dark coloured, but not well defined wood near the centre in *T Chebula* and *citrina*, no heartwood in the remaining species Pores moderate-sized to large, prominent on a vertical section Medullary rays fine, numerous, uniform and equidistant, the distance between two rays being less than the transverse diameter of the pores Concentric bands of soft texture continuous in *T belerica*, *bicalata*, *alata* and *Catappa*, interrupted and sometimes wanting in the other species

1 *T belerica*, Roxb Fl Ind ii 431, Hook Fl Ind ii 445, Beddome i 19, Brandis 222, Kurz i 455, Gamble 39 Vern *Bibela*, *beyleh*, Pers, *Bahera*, *bhaura*, *behari*, Hind, *Lohera*, Beng, *Bakers*, Rajbanshi, *Kanom*, Lepcha, *Chirora*, Gbros, *Hulluck*, *bauri*, Ass, *Thara*, Uriya, *Tini*, *lattu elupay*, Tam, *Tani*, *tandi*, *toandi*, *thandra*, Tel, *Tahaka*, *tata*, *banjur*, Mar, *Batra*, *gh*, *Tutsein*, Burm

A large deciduous tree, bark  $\frac{1}{2}$  inch thick, bluish grey, with numerous fine vertical cracks Wood yellowish grey, hard, no heartwood, not durable, readily attacked by insects, annual rings indistinct Pores of two sizes irregular, contain tannin pores fine



Eastern and Western moist zones, Eastern Himalaya, Bengal, Burma, South India and the Andamans.

Weight, according to Benson and Skinner. No. 37, 44 lbs ; A. Mendis, 42 lbs. ; Brandis' Burma List, 1862, No. 106, 60 lbs. ; our specimens give an average of 47 lbs. Benson's experiments with bars 3 feet  $\times$  1·4 inch  $\times$  1·4 inch, gave  $P = 797$  ; Skinner gives  $P = 656$ .

Wood used in South Kanara for furniture and cabinet-making and in Burma for planking, furniture and rice-pounders.

		lbs.
W 743.	South Kanara . . . . .	42
B 308.	Burma (1867) . . . . .	47
B 816.	Burma . . . . .	51
B 2536.	Burma (1862) . . . . .	47
B 2210.	Andaman Islands (1866) . . . . .	47
B 1500.	Burma . . . . .	47
No. 19.	Ceylon Collection (marked <i>C. zeylanica</i> ) . . . . .	42

2. No. 90. Adrian Mendis, Ceylon Collection, weight 51 lbs.  $P = 464$ . Vern. *Ukbeiriye*, Cingh., is probably *C. calycina*, Bth. ; Thwaites Enum. 121 ; Hook. Fl. Ind. ii. 439. The wood is brick-red ; in structure it resembles that of *C. integerrima*, but the pores are fewer, and the broad rays are narrower and at regular distances.

## 6. ANISOPHYLLEA, Br.

1. *A. zeylanica*, Bth. ; Hook. Fl. Ind. ii. 442 ; Thw. Enum. 119 ; Beddome t. 195. *Tetracrypta cinnamomoides*, Gard. and Ch. Vern. *Wellipiyanne*, Cingh.

A tree. Wood greyish brown, moderately hard. Pores moderate-sized and large, filled with a white substance, prominent on a vertical section as white streaks. Medullary rays of two classes, numerous but indistinct, fine, between fewer moderately broad rays. Bars of soft texture and the same width as the rays crossing these and dividing the wood into numerous rectangular unequal figures.

No. 96.	Ceylon Collection . . . . .	lbs. 35
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## ORDER XLV. COMBRETACEÆ.

An Order containing 8 Indian Genera of trees, shrubs or climbers, containing some of the most important of the timber trees of the Indian forests. It is divided into 2 Tribes :—

- Tribe I.—*Combretææ* . . . . . *Terminalia*, *Calycopteris*, *Anogeissus*, *Lumnitzera*, *Combretum* and *Quisqualis*.  
 „ II.—*Gyrocarpeæ* . . . . . *Illigera* and *Gyrocarpus*.

Four of these genera are here described, most of the remainder contain climbing shrubs. *Lumnitzera* contains two small evergreen trees. *L. racemosa*, Willd. ; Hook. Fl. Ind. ii. 452 ; Beddome ciii. ; Brandis 221 ; Kurz i. 468 (*Petaloma alternifolia*, Roxb. Fl. Ind. ii. 372) Vern. *Kripa*, *Kirpa*, Beng. ; *Baireya*, Cingh. ; *Yengyé*, Burm., is a tree of the muddy creeks and tidal forests of the Sundarbans, Malabar, Arracan, Tenasserim and the Andamans, also found by Beddome at Balasore. It has a strong and durable wood used for house-posts, and in Calcutta for fuel (Roxburgh). *L. coccinea*,

W and A, Hook Fl Ind n 452 (*L. littorea*, Voigt, Kurz 469) is a small tree of the mangrove swamps of Tenasserim. *Combretum* comprises 16 large shrubs generally climbing found in the moist zones of India and Burma of which the most common is *C. decandrum* Roxb Fl Ind n 232, Hook Fl Ind n 452 Brandis 221, Kurz 460 Gamble 40 Vern *Punk*, *pharsia*, *dhobela* Hind, *Kalilara* Nep, *Pindik*,  
in evergreen scandent shrub with  
of the highest trees and found in  
It has a whitish grey bark and  
moderate sized evenly distributed  
soft light-brown wood  
medullary rays (E 3301 Darjeeling Terai) *Quisqualis indica* Roxb Fl Ind n 427  
Vern *Dawashmine*, Burm a climbing shrub with red  
parts of India

soil light-brown wood moderate sized evenly distributed  
medullary rays (E 3301 Darjeeling Terai) *Quisqualis indica* Forb Fl Ind n 427  
Vern *Dawashmine*, Burm a climbing shrub with red  
Fl Ind n 460  
C B  
of the Khasia

Hills all scandent shrubs

Wood moderately hard to very hard, with a distinct dark-coloured heartwood in some, but not in all species. Pores varying in size. Medullary rays uniform, equidistant, fine or very fine, very numerous, the distance between the rays less than the diameter of the pores. The wood of *Gyrocarpus* is anomalous.

## 1 TERMINALIA, Lindl.

Contains about 12 Indian trees, mostly of very large size and furnishing valuable timber as well as other products. *T. procera*, Roxb Fl Ind n 429, Hook Fl Ind n 444. Kurz: 454 is a lofty tree of the Andaman Islands. *T. fatidissima* Griff., Hook Fl Ind n 415, is a tree of Mergui. *T. pyrifolia* Kurz: 457, Hook Fl Ind n 448. Vein *Leinben*, Burm, is a Burmese deciduous tree, with wood weighing 39 lbs per cubic foot.

Wood moderately hard to very hard. A distinct, dark-coloured, very hard heartwood in *T. tomentosa*, *Arjuna*, *myriocarpa*, and *paniculata*, dark-coloured, but not well-defined wood near the centre in *T. Chebula* and *citrina*, no heartwood in the remaining species. Pores moderate-sized to large, prominent on a vertical section. Medullary rays fine, numerous, uniform and equidistant, the distance between two rays being less than the transverse diameter of the pores. Concentric bands of soft texture continuous in *T. belerica*, *bi-alata*, *alata* and *Catappa*, interrupted and sometimes wanting in the other species.

1. *T. belorica*, Roxb Fl Ind. n 431, Hook Fl Ind n 445, Beddome t 19, Brandis 222, Kurz 1 455, Gamble 39 Vern *Babela*, *beleyleh*, Pers , *Bahera*, *bhaura*, *behara*, Hind , *bohara*, Beng , *Bahers*, Rybanshi, Kanom, Lepcha, *Chirora*, Gáro, *Hulluck*, *bauri*, Ass , *Thara*, Uriya, *Tini*, *lattu elupay*, Tam , *Tani*, *tandi*, *toandi*, *thandra*, *Thi* Kan , *Bherda*, *bahera*, Mar , *Tahala*, *tała*, *banyir*, Gondi, *gh*, *Thitseim*, Burm

A large deciduous tree, bark  $\frac{1}{2}$  inch thick, bluish grey, with numerous fine vertical cracks. Wood yellowish grey, hard, no heartwood, not durable, readily attacked by insects, annual rings indistinct. Pores of two sizes, large and small, the large ones frequently subdivided, joined by irregular, wavy, concentric bands of softer tissue, which contain the small pores. Fine, uniform and equidistant medullary rays are distinctly visible.

in the harder and darker portions between the bands, and on the radial section.

This wood distantly resembles in structure that of *Ougeinia dalbergioides*, but the bands of soft tissue are more continuous, and the medullary rays are less prominent.

Sub-Himalayan tract from near the Indus eastwards, forests of India and Burma.

Growth moderate to rapid, 3 to 7 rings per inch of radius. Weight, according to Kyd's Assam experiments, 43 lbs. per cubic foot; Central Provinces List, 39 lbs.; Brandis' Burma List, 1862, No. 47, 40 lbs.; the average of our specimens gives 43 lbs. Kyd gives  $P = 378$ . The wood is used for planking, packing cases, canoes, and in the North-Western Provinces for house-building after steeping in water which has the effect of making it more durable. In the Central Provinces it is used for plough shafts and carts when *bijasāl* is not available. In South India it is used for packing-cases, coffee-boxes, catamarans, and grain measures. The fruit is one of the myrabolans, and is exported to Europe to be used in dyeing cloth and leather and in tanning. Native ink is made of it, and it is used in medicine as a purgative and for other purposes. The kernels of the fruit are eaten, but are said to produce intoxication if eaten in excess (Hunter's Statistical Account of Bengal, xvi. p. 51), and an oil is obtained from them which is used for the hair. The fruit is eaten by monkeys, deer, goats, sheep, and cattle. The tree gives a copious gum, which does not seem to be of much use. The leaves according to the Indore Forest Report of 1876-77 have been used as an antiseptic to impregnate sleepers of *Salci* (see under *Boswellia thurifera*, p. 66), which are said, after soaking for five months in a tank filled with Bahera leaves and water, to have been rendered durable.

		lbs.
P 1190.	Madhopūr, Punjab . . . . .	35
O 534.	Dehra Dūn . . . . .	58
O 2995.	Garhwal (1874) . . . . .	59
O 349.	Gorakhpur (1868) . . . . .	52
C 176.	Mandla, Central Provinces (1870) . . . . .	...
C 1125.	Aliiri Reserve, Central Provinces . . . . .	42
C 2737.	Moharli Reserve, Central Provinces . . . . .	44
C 2773.	Melghāt, Berar . . . . .	...
E 663.	Bamunpokri, Darjeeling Terai . . . . .	46
W 1188.	South Kanara . . . . .	44
B 2532.	Burma (1862) . . . . .	...
No. 53.	Salem Collection (marked <i>Wrightia antidysenterica</i> ) . . . . .	52

2. *T. Chebula*, Retzius; Hook. Fl. Ind. ii. 446; Roxb. Fl. Ind. ii. 433; Beddome t. 27; Brandis 223; Kurz i. 456; Gamble 39. Vern. *Harra*, *har*, *harara*, Hind.; *Hilikha*, Ass.; *Haritāki*, Beng.; *Silim*, Lepcha; *Karedha*, Uriya; *Halra*, *harla*, Dekkan; *Karka*, *hir*, *harro*, *mahoka*, Gondi; *Kadakai*, Tam.; *Karaka*, *kadukar*, Tel.; *Heerda*, Kan., Mar.; *Alalé*, Mysore; *Kajo*, Magh; *Pangah*, Burm.; *Aalu*, Cingh.

A large deciduous tree. Bark  $\frac{1}{4}$  inch thick, dark brown, with numerous generally shallow vertical cracks. Wood very hard, brownish grey, with a greenish or yellowish tinge, fairly smooth and close-grained, fairly durable, seasons well. No regular heartwood, but frequently irregular masses of dark purple wood near the centre. Annual rings indistinct. Pores small and moderate-sized, uniformly distributed, often subdivided; each pore or group of pores surrounded by a narrow ring of soft tissue. Medullary rays very fine, uniform, equidistant, very numerous, distinctly visible on a radial section. The structure of the wood differs from that of *T. tomentosa*, chiefly by smaller pores.

Sub-Himalayan tract from the Sutlej eastwards, ascending to 5,000 feet; Bengal, Assam, Chittagong, Central and South India.

Growth moderate 6 to 10 rings per inch of radius The weight and transverse  
 gth have been determined by the following experiments —

Name of person con- ducting experiment	Year	Wood whence procured	Number of ex- peri- ments	Size of bar			Weight	Value of 1'	
				Ft.	In	In			
Thompson and No 48 runner 1010 No 126 Ulrich ythis yd	1868	Burma	3	3 x 14 x 14			68	1033	
		Satpuras					63		
		India		3 x 1 x 1			66	1050	
	1869	Burma					63		
	1869			Various			60	1033	
	1872	South India					54	85	
		India	10				4*		
	1878	See list below					63		
	1881	Calpara		1	2 x 1 x 1		66	850	(T. H. H. H.)

The wood takes a good polish and is fairly durable it is used for furniture carts  
 agricultural implements and house building Beddome says it is cross-grained and  
 It is being tried for sleepers in Bengal The bark is used for tan  
 which are of a rather better  
 from Bombay to Europe  
 the Forest Department  
 in it alone In 1877 78  
 erage a lakh The upper pe  
 engi angikhar kalchar,  
 and with iron-clay give  
 igs which are also used for  
 parent oil

Hind Kohi Nep)

a good sort of ink

ink and in dyeing and tanning

the kerri oil

- O 213 Garhwal (1868)
- O 528 Dehra Dun
- O 336 Gorakhpur (1869)
- C 181 Manila Central Provinces
- C 1159 Alin Peserve Central Provinces (1870)
- C 842 Bagaral Reserve Berar
- C 1247 Gamsur Madras
- E 671 Bamunpokri Darjeeling Terai
- I 2374
- D 1074 North Arcot Madras
- No 60 Salem Collection

lbs.  
58  
66  
60  
67  
68  
69  
60  
67  
63  
62

3 T. citrina, Roxb Fl Ind n 435, Hool Il Ind n 416, Kurz  
 1 456 Vern Haritaki, Beng, Hilika, silikka, Aes, Hortueh, Cachar,  
 Ayoo, Burm

A large deciduous tree Bark light grey, exfoliating with few large  
 irregular flakes Wood grey, darker towards the centre, hard Struct-  
 ure similar to that of T. Chebula

Andaman

cubic foot Used for planks  
 repant

R.  
49

- F 2109, Nowgong Assam
- B 192 Andaman Islands (Kurz 1866)

4. **T. Catappa**, Linn.; Hook. Fl. Ind. ii. 444; Roxb. Fl. Ind. ii. 430; Beddome t. 20; Kurz i. 454. The Indian Almond. Vern. *Badam*, Beng.; *Taree*, Kan.; *Nat vadam*, Tam.; *Vedam*, Tel.; *Adamarram*, Mal.; *Catappa*, Malay.

A large deciduous tree, with whorled branches, leaves turning red in the cold season. Wood red, with lighter-coloured sapwood, hard. Pores moderate-sized, scanty, joined by wavy, short and concentric bands of soft texture. Medullary rays fine.

Beach forests of the Andaman Islands; cultivated in most parts of India and Burma.

Weight, according to Skinner, No. 125, 32 lbs. per cubic foot.  $P = 470$ . Wallich also gives 32, while our specimen gives 41 lbs. Beddome says the wood is used for various purposes in Madras. The kernels of the nuts are eaten at dessert; they are remarkable for the spiral folds of the cotyledons; the bark and leaves give a black dye. It is one of the trees on the leaves of which the "Tasar" or "Katkura" silkworm (*Antheraea Paphia*) is fed.

E 3005.	Calcutta	.	.	.	.	.	.	.	lbs.
B 1933.	Andaman Islands (Kurz, 1866)	.	.	.	.	.	.	.	41

5. **T. paniculata**, W. and A.; Hook. Fl. Ind. ii. 448; Beddome t. 20; Brandis 226. *Pentaptera paniculata*, Roxb. Fl. Ind. ii. 442. Vern. *Pe-karakai*, Tam.; *Neemeeri*, Tel.; *Kinjal*, *kindal*, Mar.; *Honal*, *huluvá*, *hulvé*, Kan.; *Poo mardá*, *pillai mardá*, Anamalais.

A large deciduous tree. Wood grey, with dark heartwood, very hard. Pores large and moderate-sized, oval, numerous. Medullary rays very fine, uniform and equidistant, wavy, very numerous; the transverse diameter of the pores many times larger than the distance between two medullary rays. Pores surrounded by faintly marked patches of soft tissue, often arranged in oblique and wavy lines.

Western moist zone; forests of the western coast from Bombay southwards.

Weight, 61 lbs. per cubic foot. Wood valuable, though not quite as good as that of *T. tomentosa*. It is improved by being kept under water. It is fairly durable. It makes good planking and is used for the handles of ploughs in Ratnagiri.

W 1221.	North Kanara	.	.	.	.	.	.	.	lbs.
D 1280.	Anamalai Hills	.	.	.	.	.	.	.	57
									65

6. **T. bialata**, Wall.; Hook. Fl. Ind. ii. 449; Kurz i. 456. *Pentaptera bialata*, Roxb. Fl. Ind. ii. 441. Vern. *Leinben*, Burm.

A large deciduous tree. Wood grey, beautifully mottled, moderately hard. Structure the same as that of *T. belerica*.

Burma and the Andaman Islands.

Weight, Brandis' Burma List, 1862, No. 49, gives 39; our specimens give 48 lbs. per cubic foot. Skinner No. 124 gives weight 64 lbs., and  $P = 1042$ , but there may have been some mistake.

B 1417.	Tharrawaddi, Burma	.	.	.	.	.	.	.	lbs.
									48

7. **T. tomentosa**, W. and A.; Hook. Fl. Ind. ii. 447; Beddome t. 17; Brandis 225; Kurz i. 458; Gamble 39. *Pentaptera crenulata*, *coriacea* and *tomentosa*, Roxb. Fl. Ind. ii. 438-440. Vern. *Saj*, *sein*, *asan*, *assain*, *assaina*, *asna*, *sadri*, Hind.; *Piasal*, *usan*, Beng.; *Jhau*, *Rajbanshi*; *Amari*, Ass.; *Taksor*, Lepcha; *Sahájú*, *kala sahájú*, Uriya; *Barsaj*, Bijeragogarh; *Karra marda*, *karú marúthú*, *anemúí*, Tam.; *Maddi*, *hallá naddi*, *nella-madu*, Tel.; *Matti*, *kari matti*, *banapu*, Kan.

*Murada, kali maruthai, Arcot, Karhaya, sadora, holda, dudi maddi, Hyderabad, Ain, madat, yén, Mar, Saja, Baigas, Maru, Gondí, Madge, Bhíl, Toukkyan, Burm, Chouchong, Taleing, Kumbuk, Cingh*

A large deciduous tree Bark one inch thick, grey to black, with long, broad, deep, longitudinal fissures, and short, shallow, transverse cracks, inner substance red when fresh Sapwood reddish white, heartwood dark brown, hard, beautifully variegated with streaks of darker colour, shewing on a radial section as dark streaks which are generally wavy or undulating, durable, seasons well and takes a good polish Numerous concentric wavy lines unequally distributed Pores moderate sized and large, uniformly distributed, each pore enclosed in an irregularly shaped and generally elongated patch of soft tissue, these patches are often arranged in concentric lines and frequently joined by thin, white, wavy, concentric bands Medullary rays not distinct, very fine, numerous, uniform, equidistant, often wavy, the transverse diameter of the pores many times larger than the distance between the rays In the sapwood the patches of soft tissue enclosing the pores are more distinct, and the medullary rays more prominent

4 000 feet in places

ments —

the following experi

Experiment by whom conducted.	Year	Wood whence procured	Number of experiments	Size of scantling	Weight	Value of 1
				Ft In In		
Puckle	1899	Mysoore	3	2 x 1 x 1	56	1 010
(List)	1883				57	...
(List) Paris Exhibition	1867	Central Provinces			59	
P Thompson	1890	"			55	"
Skinner No 127	1882	South India		Various	60	600
† No 128	1882			"	55	640
Baker	1879	Jynagbur	4	7 x 2 x 2	62	67
French	1881	South India at Erode	"	15 x 1 x 1	59	585
Balfour		"	3	7 x 2 x 2	60	65
Benson	...	Burma		3 x 1 x 1 1/4	71	1,001
Brandis No 60	1867		...		58	...
	1884		3	3 x 1 x 1	56	603
Smythies	1893	See list below	16		61	

\* T. coriacea, Skinner p 143

† T. glabra, Skinner p 150.

Its durability is uncertain, in Burma the heartwood decays rapidly in North India







*Dinduga*, *dindlu*, *bejalu*, *dindal*, Kan.; *Arma*, *yerma*, Gondi; *Dhawa*, Baigao; *Dhaundak*, Bhil; *Dhaura*, Kurku; *Daawoo*, Cingh.

A large tree with smooth, whitish grey bark,  $\frac{1}{8}$  inch thick, with shallow, irregular depressions, caused by exfoliation. Wood grey, hard, shining, smooth, with a small purplish brown, irregularly shaped, extremely hard heartwood. Sapwood in young trees and branches yellow. Annual rings marked by darker lines. Pores small, very numerous, uniformly distributed, often subdivided. Medullary rays very fine, extremely numerous, uniform, equidistant, distinctly visible on a radial section, often giving the wood a mottled appearance. The transverse diameter of the pores equal to the distance between the medullary rays.

Sub-Himalayan tract from the Ravi eastwards ascending to 3,000 feet, Central and South India.

Growth moderate, 7 rings per inch of radius. Weight, 65 lbs. (Puckle and Skinner, No. 51); 61 (R. Thompson); 64 (Central Provinces List); 75 to 80 lbs. when green; our specimens give an average of 62 lbs. Skinner gives  $P = 1220$ , while French of the Madras Railway gives 752 and Puckle from 3 experiments with bars  $2' \times 1" \times 1"$ , 870. The wood is highly valued on account of its great strength and toughness, but it splits in seasoning and unless kept dry is not very durable. It is used for axe handles, poles for carrying loads, axles in the construction of furniture, agricultural implements [and in ship-building. It has been recommended for sleepers. Out of 18 sleepers which had lain 7 to 8 years on the Mysore State Railway there were found, when taken up, 4 good, 10 still serviceable and 4 bad. It gives a good fuel and an excellent charcoal. It gives a gum which is extensively sold for use in cloth-printing. The leaves are used for tanning.

		lbs.
P 446.	Ajmere . . . . .	63
O 233.	Garhwal (1868) . . . . .	68
O 2997.	„ (1874) . . . . .	64
O 531.	Dehra Dún . . . . .	62
O 394.	Oudh . . . . .	62
C 2776.	Melghát, Berar . . . . .	59
C 190.	Mandla, Central Provinces (1870) . . . . .	58
C 1121.	Ahiri Reserve, Central Provinces . . . . .	65
C 2744.	Moharli Reserve, Central Provinces . . . . .	55
C 1244.	Gumsúr, Madras . . . . .	66
D 1282.	Anamalai Hills, Madras . . . . .	56
No. 21.	Salem Collection . . . . .	69

2. *A. acuminata*, Wall.; Hook. Fl. Ind. ii. 450; Beddome t. 16; Brandis 228; Kurz i. 466. *Conocarpus acuminata*, Roxb. Fl. Ind. ii. 443. Vern. *Chakwa*, Beng.; *Panchi*, *pasi*, Uriya; *Numma*, Tam.; *Páchi mánu*, *panchman*, *paunchinan*, *bucha karum*, *pashi*, *pansi*, Tel.; *Phás*, Mar.; *Saikamehha*, *thekri napay*, Magh; *Yung*, *sehoong*, Arracan; *Yungben*, Burm.; *Phassi*, Mar.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, dark grey, rough, granulated when old. Wood grey, sometimes yellowish grey with a greenish tinge, shining, in structure moderately hard, resembling that of *Anogeissus latifolia*, but the pores considerably larger and the transverse diameter of the pores greater than the distance between two rays.

Chanda District, South India, Chittagong and Burma.

Weight, according to Skinner, No. 50, 59 lbs., 53 lbs. (Brandis' Burma List, 1862, No. 51). Our specimen gave 57 lbs. Skinner gives  $P = 880$ . The wood warps and cracks in seasoning, and is not very durable especially where exposed to water. Used in Burma and in Madras for building. Roxburgh says it is durable if kept dry, but soon decays if exposed to wet. The leaves are used for tanning in Gumsúr.

- C 1143 Ahiri Reserve Central Provinces  
 B 3204 Burma (1862)  
 B 3095 Prome, Burma

lbs  
 67

The Central Provinces and Burma woods correspond exactly in structure

3 *A. pendula*, Edgew., Hook Fl Ind n 451, Brandis 229  
*Conocarpus myrtifolia*, Wall Vern *Dhan, dhaukra, kala dhaukra*, Mey-  
 war, *Kardahi*, Hind

A small gregarious tree with pendulous branches, leaves turning  
 copper-coloured in the cold season Wood hard, yellowish white, with a  
 small, irregular, blackish-purple heartwood Annual rings indistinct  
 Pores very small and extremely small, often in groups between the very  
 fine, very numerous, uniform and equidistant medullary rays

Arid and northern dry zones, Rajputana Malwa Plateau as far as the Nerbudda  
 in Nimar, Mandla District on the Nerbudda (?)

Cunningham's 5 experiments made at Gwalior with bars  $2 \times 1'' \times 1''$ , give  
 the weight at 59 lbs per cubic foot and  $P = 837$  the average of the 5 experiments  
 which ranged from 697 to 1034 It coppices well but the wood is not in general use

P 454 Ajmere

#### 4 GYROCARPUS, Jacq

1. *G. Jacquini*, Roxb Fl Ind i 445, Hook Fl Ind n 461,  
 Beddome t 196, Kunz i 470 Vern. *Zaitun*, Hind, *Tunaku, Kumar*  
*pulki*, Tel, *Pinlay thitkouk*, Burm

A deciduous tree Wood grey, soft Pores large and moderate sized,  
 often subdivided, uniformly distributed, well marked on a longitudinal  
 section Medullary rays very short, moderately broad, the distance  
 between them greater than the transverse diameter of the pores

South India Tenasserim and Andaman Islands

Weight, 23 lbs per cubic foot Wood used in South India to make boxes and  
 toys It is preferred to all others for cutmarins The seeds are made into rosaries  
 and necklaces

D 1079 North Arcot, Madras

lbs  
 23

### Order XLVI MYRTACEÆ

An Order containing 11 Indian Genera including *Eucalyptus* some species of  
 which are now almost naturalised The Indian Genera belong to 3 Tribes —

Tribe I — *Leptospermæ*

*Melaleuca Eucalyptus* and  
*Tristania*

II — *Myrtæ*

*Podium Rhodomyrtus Ri-*  
*damnia Decaspermum* &c

III — *Lecythidæ*

*Eugenia*  
*Barringtonia, Corrya* &c  
*Planchonia*

of Tern  
 Vern  
 of Tern

*Rhodomyrtus torresiana* DC Hook Fl Ind n 469, L'Her  
*Thaunty*, Burghers, is a large shrub abundant in the L's

Nilgiris, said by Beddome to have a white soft wood, with a pink heartwood and to be used for turning. Its fruit is edible, and is made into preserves. *Rhodamnia trinervia*, Bl., Hook. Fl. Ind. ii. 468; Kurz i. 475, is a shrub of Tenasserim; while *Decaspermum paniculatum*, Kurz i. 475; Hook. Fl. Ind. ii. 470, is an evergreen tree which is said by Kurz to spring up on deserted hill toungyas at 3,000 to 4,000 feet elevation in Marlapan and Tenasserim. The Myrtle (*Myrtus communis*, Linn.) is cultivated in India.

The flower-buds of *Caryophyllus aromaticus*, Linn., of the Moluccas give the Cloves of commerce, and *Pimenta officinalis*, Ldl., of the West Indies, Pimento or Allspice.

Pores small and moderate-sized. Medullary rays numerous, fine, rarely broad. Concentric bands of soft tissue not common.

## 1. MELALEUCA, Linn.

1. *M. Leucadendron*, Linn.; Hook. Fl. Ind. ii. 465; Kurz i. 472. *M. Cajuputi*, Roxb. Fl. Ind. iii. 394.

An evergreen tree. Bark white, thick, spongy, peeling off in papery flakes. Wood reddish brown, hard. Pores moderate-sized, scanty. Medullary rays very fine, extremely numerous.

Tenasserim.

The leaves give the Cajuput oil of commerce, which is largely exported from the Malay Archipelago and is used in medicine as a stimulant and diaphoretic.

O 3270. Saharanpur Gardens.

## 2. EUCALYPTUS, L'Her.

Numerous species of this genus of trees have been introduced into India from Australia, where they have the general name of "Gum trees;" but their success has been very variable. *E. Globulus*, Lab., here described, and *E. obliqua*, L'Her., have been almost completely naturalised on the Nilgiris. The latter species is known by the name of "Stringy Bark," and in Victoria, South Australia and Tasmania is an immense tree, reaching occasionally to 300 feet in height, with a girth of 100 feet (Brandis, 231). It has also been tried at Changa Manga, but has failed at Lucknow. At Lucknow, however, the cultivation of *E. saligna*, Smith, "The White or Grey Gum" of New South Wales, has succeeded well in the Wingfield Park, and that of *E. rostrata*, Schlecht, in the Horticultural Gardens. At Changa Manga Plantation several species have been found to grow well, and at Abbottabad *E. Globulus*, Lab., *E. Stuartiana*, F. Müll., *E. tereticornis*, Sm., *E. viminalis*, Lab., and *E. leucorylon*, F. Müll., have succeeded admirably. The seeds of numerous other species have been sown at different places in the plains and valleys of the Punjab, as well as at the Botanic Gardens at Saharanpur, the Horticultural Gardens at Lahore and Lucknow, and many places in the Central Provinces, Berar and Central India; and there is no doubt that when it has been determined which species are most suited to the very different climates and soils of the various parts of India, the cultivation of the species of Eucalyptus which possess so many valuable properties, such as their quick growth, useful timber, and the numerous products to be obtained from their leaves and bark, their cultivation should be encouraged and their growth fostered.

1. *E. Globulus*, Labillardière; Brandis 231. The Blue Gum. Vern. *Kurpoora maram*, Madras.

A lofty tree with fibrous deciduous outer bark. In Australia the wood is brown, hard, tough, durable. The wood of a tree grown on the Nilgiris, 18 years old and 95 feet high, is grey, with darker streaks and moderately hard. Pores moderate-sized, round, frequently arranged in groups or in radial or oblique lines. Medullary rays fine, very numerous, the intervals between the rays smaller than the diameter of

the pores . Pores marked on a longitudinal section, and medullary rays visible as narrow bands on a radial section.

Gregarious in Victoria and the south of Tasmania Introduced on the Nulgis, and now completely naturalised

Of the *Eucalyptus Globulus* several successful plantations have been established on the Nulgi Hills There are 22 plantations in all but some of them are exclusively of Wattles or Australian *Acacia*, others contain only a small proportion of *Eucalyptus*, while others have not been successful owing to bad locality or other reasons The chief good plantations are—

Near Ootacamund—

1	Aramby	38	acres planted	1863-65
2	Governor's Shola	80	,"	1870-72
(part, however, is <i>Acacia Melanoxylon</i> )				
3	Norwood	26	"	1872-73
4	Cally.	14	"	1870
5	Arnikhal	11	"	1873
6	Bailie	33	"	1871

Near Wellington—

7	Newman	35	"	1870-71
8	Old Forest	200	"	1872-73

or, including smaller ones, about 500 acres altogether Colonel Beddome in his Report of 12th June 1876, from which the above is taken, says that in Aramby the growth is very unequal, some being 30 to 40 inches in circumference, others only 3 to 4 inches, that about 504 were then found per acre Measurements of 15 of the largest trees, made by Mr Gass, gave an average girth of 3½ inches height 85 feet,

amount of material per acre at different ages  
The *Eucalyptus Globulus* has been tried at \_\_\_\_\_ on account of the reports that it would prevail in reclaiming marshy land Whatever may be the tree has almost universally failed in the place succeeded in a few localities At \_\_\_\_\_ whether from frost or for what reason,

perhaps the largest of the species usually tried in India, the seed if good germinates well usually, and the plants at once begin to grow fast, but they are very tender of transplanting so that that operation has to be very carefully \_\_\_\_\_ of

the transplanting of *Eucalyptus*, the following memorandum was drawn up by Colonel H. R. Morgan, Deputy Conservator of Forests, Madras :—

"The seed, which should be procured in January or February, should be placed in beds in rows 6 inches apart. When the plants are 6 inches high, they should be taken up and placed 6 inches apart in beds; the roots should be shortened to 4 inches. When 3 feet in height, the plants are taken up with a ball of earth round their roots, moss is bound tightly round the ball, and the plants are left in beds well earthed up about the roots, and watered till the young rootlets show through. They may then be put out. April is the best month for planting, as the plants are then able to make strong roots before the monsoon. When moss is not available, bamboo pots may be used, taking care to keep the large end of the joint for the top of the pot; the hole at the bottom to be plugged with grass. The plants should be placed in the pots when 8 inches in height, and left till they are 2 feet high and the roots show through; then thrust the roots through, and the plant comes out with a ball of earth attached to the roots. Pits should be 18 inches cube."

Weight, Mr. Newbery's "Descriptive Catalogue of the Specimens in the Museum at Melbourne, illustrating the economic woods of Victoria," gives 41 lbs. on an average; our specimen gave 43 lbs. The weight and value of P., calculated from the average of the six experiments given at page 203 of Laslett's "Timber and Timber Trees," were  $W = 64$  and  $P = 531$ . Wood strong and tenacious, durable, extensively used in Australia for beams, railway sleepers, piers and bridges; also for ship-building. The wood from the Nilgiri plantations has scarcely been used, except for firewood or charcoal. The leaves give an essential oil used in medicine, and paper has been made of the bark.

W 1094.	Nilgiri Hills,	7,400 feet	age 18	years,	height 95 feet	lbs. 43
W 1095-7.	" "	6,000 "	" "	2, 3, 4 "	" "	42, 43, and 60 feet ...

### 3. PSIDIUM, Linn.

1. *P. Guava*, Raddi; Hook. Fl. Ind. ii. 468; Brandis 232; Kurz i. 476; Gamble 40. *P. pomiferum* and *P. pyrifera*, Willd.; Roxb. Fl. Ind. ii. 480. The Guava Tree. Vern. *Amrūt*, *amrūd*, *safri-ām*, Hind.; *Peyara*, Beng.; *Amuk*, Nep.; *Modhuriam*, Ass.; *Piyara*, Beng.; *Segapu*, *koaya*, Tam.; *Jama*, *coya*, Tel.; *Pela*, Mal.; *Sebe*, Kan.; *Malaka beng*, Burm.

A small evergreen tree, with smooth and thin greenish grey bark, peeling off in thin flakes. Wood whitish, moderately hard, even-grained. Pores small, numerous. Medullary rays moderately broad, short, the distance between them many times greater than the transverse diameter of the pores.

Introduced from America and now cultivated and occasionally semi-wild all over India.

Weight, Wallich gives 41 lbs.; our specimen 42 lbs.; Skinner 47 lbs. and  $P = 618$ .

Cultivated for its fruit. The bark is used in medicine as an astringent, and (or the leaves) for dyeing in Assam. Skinner says that the wood works well and smoothly, that it is used for wood-engraving and for spear handles and instruments.

O 1371.	Gonda, Oudh	lbs. 42
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### 4. EUGENIA, Linn.

One of the largest of the Indian genera of trees. It contains about 77 trees, chiefly found in the moist zones of North-East and South India and Burma; 33 occur in South India, and 30 to 40 in Burma, 4 in the North-West and Central India, and a large number in Eastern Bengal. Few of them are, however, of very great importance; and besides those here described, it will suffice to mention only one or two of the most

common A list taken from Mr Duthie's description in Volume II of the Flora Indica, pages 471 to 506, is, however, given for the sake of the references —

SECTION I—JAMBOSA

1	<i>E. formosa</i> , Wall	North East Himalaya down to Burma
2	<i>E. amplexicaulis</i> , Roxb Fl Ind ii 493, Kurz 1 493	Chittagong
3	<i>E. malaccensis</i> Linn	(Cultivated)
4	<i>E. polypetala</i> Wight, Kurz 1 493 ( <i>E. angus- tifolia</i> , Roxb F <sup>l</sup> Ind ii 490)	Khasia Hills Eastern Bengal, Chittagong
5	<i>E. diospyrifolia</i> , Wall	Khasia Hills Sylhet
6	<i>E. Munronis</i> , Wight, Beddome cix	Khasia Hills, Western Ghâts
7.	<i>E. aquea</i> Burm., Roxb Fl Ind ii 492, Beddome cix, Kurz 1 491	Chittagong Burma, Cey- lon
8	<i>E. Jambos</i> Linn., Roxb Fl Ind ii 494, Beddome cix, Brandis 233, Kurz 1 495, Gamble 40	(Cultivated)
9	<i>E. macrocarpa</i> Roxb Fl Ind ii 497, Kurz 1 492	Eastern Bengal, Burma
10	<i>E. javanica</i> , Lamk., Kurz 1 494 ( <i>E. alba</i> , Roxb Fl Ind ii 493)	Andaman Islands
11	<i>E. Wallichii</i> , Wight	North East Himalaya down to Burma
Var		North and East Bengal
12		Eastern Bengal, Burma
13		Burma
14	<i>E. Beddomei</i> , Duthie	Tinnevely
15	<i>E. pachyphylla</i> , Kurz 1 490	Tenasserim
16	<i>E. tristis</i> , Kurz 1 490	Ditto
17	<i>E. hemisphærica</i> , Wight, Beddome t 203	Western Ghats, Ceylon
18	<i>E. lanceolaria</i> Roxb Fl Ind ii 494	Sylhet
19	<i>E. bifaria</i> , Wall ( <i>E. laurifolia</i> , Roxb Fl Ind ii 489)	Ditto
20	<i>E. Kurzii</i> , Duthie	North East Himalaya to Burma
21	<i>E. albiflora</i> , Duthie Kurz 1 491	Burma
22	<i>E. latifolia</i> , Ham ( <i>E. Wightii</i> Beddome cix)	Western Ghâts
23	<i>E. ramosissima</i> , Wall, Gamble 40	North East Himalaya to Sylhet
24	<i>E. Helferi</i> Duthie	Mergui.
25	<i>E. mangifolia</i> , Wall	Assam Eastern Bengal
26	<i>E. inophylla</i> , Roxb Fl Ind ii 490	Eastern Bengal Burma

SECTION II—SYZYGIUM

27	<i>F. Thumra</i> , Roxb Fl Ind ii 495, Kurz 1 498	Burma.
28	<i>E. vulcan</i> , Roxb Fl Ind ii 496, Kurz 1 498	Chittagong, Burma
29	<i>E. cymosa</i> Lam., Kurz 1 498	Eastern Bengal, Burma.
30	<i>E. toidalimiles</i> , Wight [ <i>E. toidalimifolia</i> , Wight, Gamble 41 ( <i>misprint</i> )]	Sikkim, Mergui
31	<i>E. myrtifolia</i> Roxb Fl Ind ii 490, Kurz 1 496	Eastern Bengal Burma.
32	<i>E. acuminatissima</i> Kurz 1 497.	Mergui
33	<i>E. Arnottiana</i> , Wight, Beddome cxi	Western Ghâts
34	<i>E. clavigera</i> , Roxb Fl Ind ii 499, Kurz 1 490, Gamble 41	North East Himalaya down to Burma, Andaman Islands
35	<i>E. leytanthe</i> Wight, Kurz 1 490	Sikkim Burma Andaman

36. *E. Wightiana*, Wight; Beddome (*E. lanceolata*, Wight; Beddome ex). Western Ghâts, Ceylon.
37. *E. pellucida*, Duthie (*E. contracta*, Kurz i. 481) Burma.
38. *E. zeylanica*, Wight; Kurz i. 481 (*E. spicata*, Lam.; Beddome t. 202. *E. glandulifera*, Roxb. Fl. Ind. ii. 496). Eastern Bengal, Burma, Andamans, Western Ghâts.
39. *E. grata*, Wall.; Kurz i. 480 . . . Assam, Khasia Hills, Burma.
40. *E. rubricaulis*, Miq. . . . . Tenasserim.
41. *E. montana*, Wight; Beddome cvii. . . . . Nilgiris.
42. *E. bracteolata*, Wight; Kurz i. 482 . . . . . Tenasserim.
43. *E. lissophylla*, Thwaites; Beddome cviii. . . . . Western Ghâts, Ceylon.
44. *E. venusta*, Roxb. Fl. Ind. ii. 491; Kurz i. 487 . . . . . Tipperah, Burma.
45. *E. Gardneri*, Thw.; Beddome cviii. . . . . Western Ghâts, Ceylon.
46. *E. caryophyllæa*, Wight; Beddome cviii. . . . . Ditto, ditto.
47. *E. frondosa*, Wall. . . . . Nepal.
48. *E. areolata*, DC. . . . . Ditto.
49. *E. khasiana*, Duthie . . . . . Khasia Hills.
50. *E. revoluta*, Wight; Beddome cvii. . . . . Nilgiris.
51. *E. oblata*, Roxb. Fl. Ind. ii. 493; Kurz i. 488 . . . . . Assam down to Burma.
52. *E. calophyllifolia*, Wight; Beddome cvii. . . . . Nilgiris.
53. *E. rubicunda*, Wight; Beddome cviii. . . . . Tinnevely.
54. *E. cuneata*, Wall. . . . . Khasia Hills, Eastern Bengal.
55. *E. brachiata*, Roxb. Fl. Ind. ii. 488 (*E. cinerea*, Kurz i. 483). Burma.
56. *E. polyantha*, Wight . . . . . Ditto.
57. *E. malabarica*, Beddome t. 199 . . . . . Wynaad.
58. *E. alternifolia*, Wight; Beddome t. 198 . . . . . Assam, Carnatic.
59. *E. tetragona*, Wight . . . . . Sikkim, Khasia Hills, Sylhet.
60. *E. occlusa*, Miq. . . . . Nicobar Islands.
61. *E. operculata*, Roxb. . . . . Sub-Himalaya, Eastern Bengal, South India, Burma.
- Var. *E. Paniala*, Roxb. Fl. Ind. ii. 489 . . . . . Eastern Bengal, Burma.
- Var. *E. obovata*, Wall. . . . . Northern Bengal, Burma.
62. *E. Stocksii*, Duthie . . . . . Concan, Wynaad.
63. *E. balsamea*, Wight; Kurz i. 485; Gamble 41 . . . . . Sikkim, Eastern Bengal, Burma.
64. *E. fruticosa*, Roxb. Fl. Ind. ii. 487; Kurz i. 485 . . . . . Sylhet to Burma.
65. *E. Jambolana*, Lam. . . . . Throughout India.
- Var. *E. caryophyllifolia*, Roxb. Fl. Ind. ii. 486 . . . . .
- Var. *E. obtusifolia*, Roxb. Fl. Ind. ii. 485 . . . . .
65. *E. Heyneana*, Wall. . . . . Central India, Western Ghâts.

## SECTION III.—EUGENIA.

66. *E. Jossinia*, Duthie (*E. cuneata*, Beddome) . . . . . Western Ghâts.
67. *E. floccosa*, Beddome t. 200 . . . . . Tinnevely.
68. *E. codyensis*, Munro . . . . . Nilgiris, Coorg.
69. *E. macrosepala*, Duthie . . . . . Northern Kanara.
70. *E. calcadensis*, Beddome ex. . . . . Tinnevely.
71. *E. bracteata*, Roxb. Fl. Ind. ii. 490; Beddome ex. . . . . Eastern Bengal, South India, Western Ghâts.
72. *E. Rottleriana*, W. and A.; Beddome ex. . . . . Southern India.
73. *E. argentea*, Beddome ex. . . . . Wynaad.
74. *E. Mooniana*, Wight; Beddome ex. . . . . Southern India, Western Ghâts.
75. *E. microphylla*, Beddome ex. . . . . Travancore.
76. *E. singampattiana*, Beddome t. 273 . . . . . Tinnevely.
77. *E. wynadensis*, Beddome ex. . . . . Wynaad.

*E Jambos* Linn Vern *Gulab jaman* Hind *Malle nerale* Coorg is the Rose Apple, cultivated for ornament and for its fruit *E Arnottiana* Wight Vern at above 4000 feet elevation is a large tree of the forests of Madras *E aquea* Lumph, *tosa* Roxb Vern *Moung* of the forests of Chittagong *ceafolia* Roxb are handsome

Wood rough, hard and moderately hard, seasons well Some species have concentric bands of softer tissue and others have not The pores are from small to moderate sized

1 *E formosa*, Wall, Hook Fl Ind n 471, Kurz i 492, Gamble 40 *L ternifolia*, Roxb Fl Ind n 489 Vern *Bara jaman*, Nep, *Bunkonkri*, Mechi, *Bolsobak*, Garo, *Famsikol*, Lepcha

A moderate sized evergreen tree Bark greyish white smooth, thin Wood grey, hard Pores moderate sized Medullary rays fine and very fine, numerous, prominent

Eastern Himalaya and Sub Himalayan tract near streams Chittagong and Tenasserim

Weight 61 lbs per cubic foot Has large very handsome flowers and large fruit

E 2956 Tista Valley Darjeeling

lbs  
61

2 *E malaccensis*, Linn Hook Fl Ind n 471, Roxb Fl Ind n 483, Kurz i 493 Vern *Thabyoo thabyay*, Burm

A moderate sized evergreen tree Wood reddish grey, rough, soft Pores moderate sized and large Medullary rays broad or moderately broad, visible on a radial section

Cultivated in Bengal and Burma for its fruit

Weight Wallch gives 30 our specimen 38 lbs per cubic foot

B 309 Burma (1867)

lbs  
39

3 *E grandis*, Wight, Hook Fl Ind n 475, Beddome cat, Kurz i 485 *E cymosa*, Roxb Fl Ind n 192 Vern *Jam*, Beng, *Battijamb*, Sylhet, *Zebri*, Magh, *Loung thabyay*, Burm

An evergreen tree Wood red, rough, hard Pores small, joined by fine, wavy, concentric lines Medullary rays fine, wavy, numerous, uniform and equidistant

Eastern Bengal Burma and the Andaman Islands

Weight 61 to 62 lbs

B 314 Burma (1867)

B 2256 Andaman Islands (1860)

lbs  
61  
62

B 2713, 48 lbs., brought from Tavy by Dr Wallich in 1829 has a structure similar to that of *E grandis*

4 *E Kurzii*, Dutlie, Hook Fl Ind n 478, Kurz i 191, *E cerasiflora*, Kurz, Gamble Fl Vern *Jamun*, Nep, *Sunom*, Lepcha

A large evergreen tree Bark  $\frac{1}{2}$  inch thick, whitish grey Wood reddish grey, moderately hard, rough Pores moderate-sized, numerous, often subdivided Medullary rays fine and moderately broad



Hills of Bengal and Burma, from 3,000 to 6,000 feet.

Weight, 37 to 56 lbs. per cubic foot.

E 701.	Sepoydura Forest, Darjeeling, 5,500 feet.	lbs.
E 2955.	Tukdah Forest, Darjeeling, 5,000 feet (young tree)	56
		37

5. *E. tetragona*, Wight; Hook. Fl. Ind. ii. 497; Kurz i. 484. *E. praco*, Roxb.; Gamble 41. Vern. *Kemma*, *chamlani*, Nep.; *Sunóm*, Lepcha.

A large evergreen tree. Wood brownish or olive grey, shining, hard. Pores moderate-sized, numerous, uniformly distributed, oval and subdivided. Medullary rays fine, visible on a radial section.

Hills of Northern Bengal up to 6,000 feet, Chittagong.

Weight, 47 lbs. per cubic foot. Wood used occasionally for building and for the handles of tools and for charcoal.

E 682.	Sepoydura Forest, 5,500 feet, Darjeeling	lbs.
E 1416.	Mishmi Hills (Griffith, 1836)	46
		48

6. *E. operculata*, Roxb. Fl. Ind. ii. 486; Brandis 234; Kurz i. 482. *E. nervosa*, DC.; Beddome cvi. Vern. *Rai jáman*, *paiman*, *jamawa*, *dúgdúgia*, Hind.; *Yethabyay*, Burm.

A moderate-sized evergreen tree, leaves turning red in the cold season. Bark grey or dark brown, rough, with irregular hard scales, leaving cavities when they exfoliate. Wood reddish grey, hard. Pores small, often in radial lines. Medullary rays very fine, closely packed, extremely numerous.

Sub-Himalayan tract from the Jumna to Assam, Chittagong, Burma, Western Gháts and Ceylon.

Weight, 47 lbs. per cubic foot. Used for building and agricultural implements. The fruit is eaten.

O 334.	Gorakhpur (1868)	lbs.
B 305.	Burma (1867)	51
		43

7. *E. obovata*, Wall.; Gamble 40. *E. operculata*, Roxb. var. *obovata*; Hook. Fl. Ind. ii. 498; Kurz i. 482. Vern. *Kiamoni*, Nep.; *Jung song*, Lepcha; *Boda-jam*, Mechi.

evergreen tree, leaves turning red in the cold season. Bark smooth. Wood grey, rough, moderately hard. Pores moderate-sized, very numerous, joined by faint, concentric bands. Medullary rays fine.

Savannah forests of Bengal and Burma.

Weight, 51 lbs. per cubic foot. Fruit eaten.

E 584.	Khookloong Forest, Darjeeling Terai	lbs.
		51

8. *E. Jambolana*, Lam.; Hook. Fl. Ind. ii. 499 Roxb. Fl. Ind. ii. 484; Beddome t. 197; Brandis 233; Kurz i. 485; Gamble 40. Vern. *Jáman*, *jam*, *phalinda*, *jamni*, *phaláni*, *pharenda*, *phaunda*, *paiman*, Hind.; *Jam*, Beng.; *Jamo*, Uriya; *Phoberkúng*, Lepcha; *Chambu*, Gáro; *Kor-jam*, Mechi; *Jamu*, Ass.; *Naval*, *navvel*, *nawar*, *naga*, Tam.; *Nerale*, Mysore; *Narala*, Kan.; *Nasedu*, *nairuri*, *nareyr*, Tel.; *Naindi*, Gondi; *Jambál*, Mar.; *Mahadan*, Cingh.; *Zebri*, *chaku*, *kau*, Magh; *Thabyai-pyoo*, Burm.

An evergreen tree. Bark  $\frac{1}{4}$  inch thick, light grey, with large patches of darker colour, smooth, with shallow depressions caused by exfoliation.

Wood reddish grey, rough, moderately hard, darker near the centre, no distinct heartwood. Pores moderate sized and small, numerous, frequently oval elongated and subdivided. Medullary rays fine numerous, the interval between the rays less than the diameter of the pores. Fruit, fine, concentric bands of softer tissue.

SEEDS      FLOWERS      FRUIT

the act on of water well. The bark is used for dyeing and tanning and is astringent and used in medicine for cases of dysentery. The fruit is eaten. It is one of the trees on which the tasar silk worm is fed.

		lbs
P 1192	Madhopur Panjab	40
P 452	Ajmere	14
O 209	Garhwal (1868)	51
O 210		47
O 211		19
O 224		14
O 239		10
O 2993	(1874)	17
O 527	Dhara Dun	59
O 535		64
O 575	Molun Forest Kumaun Bhabar	58
O 337	Gorakhpur (1868)	71
O 338		42
C 195	Mandla, Central Provinces (1870)	52
C 1135	Ahiri Reserve Central Provinces (with a slightly different structure)	50
C 2761	Molun Reserve Central Provinces	13
C 1251	Gumsur Madras	57
E 661	Rakti Forest, Darjeeling Terai	54
F 2377	Sivoke Forest	44
F 1396	Chittagong	48
F 1958		48
I 413	Sindarbans	
B 3065	Burma (1862)	52
No 51	Ceylon Collection	36

SEEDS      FLOWERS      FRUIT      *mangolia* Wall

e name of *Eugenia*  
similar to that of

*sylvestris* Willd

Hook Fl Ind ii 433 Beddome ex (by yjia : sy : stre shwaitee Enam 116  
Vern. *Alubo* (Cingh) In structure it resembles *E. Jambolana*

9 *E. Heyneana*, Wall, Hook Fl Ind ii 500, *E. salicifolia*,  
Wight, Beddome ex, Brandis 234 Vern *Panjam bul Mar*, *Hendi*,  
Gondi, *Gambu*, Kurku

A large shrub or small tree with grey bark. Wood similar to that of *E. Jambolana*, but pores smaller.

B. in Ghats Berar and Central Provinces

C 2756 Melali P. var

19  
38

10. E. sp. Vern. *Thabyay*, Burm.

A tree with hard, close-grained, red wood. Pores small, in irregular patches of soft tissue, joined by wavy, concentric lines. Medullary rays fine, numerous.

B 316. Burma (1867)

116.  
55

5. BARRINGTONIA, Forst.

Contains about 8 Indian species chiefly from Burma. *B. speciosa*, Forst.; Hook. Fl. Ind. ii. 507; Roxb. Fl. Ind. li. 636; Beddome cxii.; Kurz i. 496. Vern. *Kyaigyee*, Burm.; *Doddá*, Andamans, is an evergreen tree of the sea-shore of the Andamans. *B. pterocarpa*, Kurz i. 498; Hook. Fl. Ind. ii. 509. Vern. *Kyaitha*, Burm., is an evergreen tree of the tropical forests of Pegu and Martaban. Four other species are described as found in Tenasserim, viz., *B. conoidea*, Griff., *B. angusta*, Kurz, *B. Helferi*, C. B. Clarke, and *B. macrostachya*, Kurz (including *B. pendula*, Kurz).

Wood soft or moderately hard. Pores small, in short radial lines between the numerous broad, or moderately broad, medullary rays. Numerous transverse bars between the rays.

1. *B. acutangula*, Gaertn.; Hook. Fl. Ind. ii. 508; Roxb. Fl. Ind. ii. 635; Beddome t. 204; Brandis 235; Kurz i. 497. Vern. *Ijál, samundar phúl, pannári, ingar*, Hind.; *Hijál, samundar*, Beng.; *Kinjolo, Uriya*; *Hark<sup>1</sup>*, Ass.; *Kahapa, batta, kurpá, kádamic*, Tel.; *Piwar*, Mar.; *Kyaitka* cavities Burm.

A small, often in evergreen tree. Bark  $\frac{1}{2}$  inch thick, dark brown, rough. Extremely numesishing, warps in seasoning, moderately hard, even-grained. Can tract from all, in radial groups between the broad and very broad, rarely in radial groups. Moderately broad, long medullary rays, which are the greater part of cubic foot. The space between

where not occupied by the  
with fine transverse (1868)  
thickly spotted with (67)

Sub-Himalayan tract in U. Gamble 4 eastwards, Oudh, Bengal, Central and South India. Burma.

Weight, Skinner, No. 20, gave 21.482. Vile Kyd's experiments (*Stravadium acutangulum*) give only 20.3 lbs. weighed 46 lbs. per cubic foot. Benson's experiments with or turning red in feet  $\times 1\frac{1}{4}$  inch  $\times 1\frac{1}{4}$  inch gave  $P = 648$ ; Skinner's experiments on Assam wood in bars 2 feet  $\times 1$  inch  $\times 1$  inch faint, concentric, table.

The wood is used for l. makers. The bark is used to and fruit, in native medicine.

1bs

C 1132. Ahiri Reserve

B 814. Burma

46

2. *B. racemosa*, Blun. 634; Beddome cxii.; Kur. Mal.; *Kyai-heng*, Burm.

A moderate-sized evergreen tree, all white, very soft, porous. Pores small and moderate-sized, numerous, uniformly distributed. Medullary rays moderately broad, long, equidistant.

Western Coast, Andaman Islands and Ceylon. It is mentioned from Assam by G. Mann in Assam Forest Report, 1874-75. Vern. *Kumringak*, Ass., but *B. acutangula* may be meant.

Skinner No 21 gives weight 53 lbs (P) per cubic foot and P=819 he also says it is used for house and cart building and that it has been tried for railway sleepers

B 1993 Andaman Islands (Kurz 1866)

lbs  
27

## 6 CAREYA, Roxb

Red & the ... ..

April and best after the grass has been burnt by jungle fires

1 C arborea, Roxb Fl Ind ii 638, Hook Fl Ind ii 511, Beddome t 205, Brandis 236 Kurz i 439, Gamble ii Vern Kumbh, Kumbh, Khumbi, Hind, Pulu, Banda, Guriar, Mandla, Balaghât, Kumri, Chhindwara, Guamar, Gondi, Boklok, Lepcha, Dambel, Garo, Ayma, pailae, poota tammi, Tam, Bida durmi, buda darimi, dudippi, Tel, Garuldi, Mysore, Bambway, Burm, Kabooay, Taleing, Tugoooy, Karen, Kahatte, Cingh

A large deciduous tree, leaves turning red in the cold season Bark  $\frac{1}{2}$  inch thick, dark grey, with vertical and diagonal cracks, exfoliating in narrow flakes, inner substance reddish, fibrous Sapwood whitish, large, heartwood dull red sometimes claret coloured, very dark in old trees, even-grained, beautifully mottled, seasons well, very durable, moderately hard Pores oval, small and moderate sized, subdivided Medullary rays numerous, fine, equidistant and uniform, the space between two consecutive rays equal to the diameter of the pores The medullary rays are visible on a radial section as narrow bands

Sub Himalayan tract from the Jumna eastwards Bengal Burma Central and South India Growth fast a round in the Bengal Fruit Museum gave 4 rings per inch of radius

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence procured.	Number of experiments.	Size of scantling	Weight.	Value of P
				Ft In In	lbs	
Wallich		Goalpara	—		43	—
Adrian Mendis	1855	Ceylon	—		39	—
R. Thompson	1869	Central Provinces	—		60	—
Skinner No 39	1862	South India	—	Various	60	870
Densen		Burma	—	3 x 14 x 14	47	879
Brandis, Nov. 22, 63	1863	—	—		85	—
"	1864	—	4	3 x 1 x 1	60	840
"	"	—	8	2 x 1 x 1	51	625
Kyd	1831	Assam	1	2 x 1 x 1	61	870
Comm. Dept.	—	Moumetsa	—	—	50	800
Smyth es	1878	See list below	12	—	54.8	—

Wood durable; the specimens brought by Dr. Wallich from Tavoy in 1828, and that brought from the Mishmi Hills by Dr. Griffith in 1836, were quite sound on being cut up, though they had been stored for 50 years in Calcutta. The wood is little used except for agricultural implements. It is being tried for railway sleepers on the Eastern Bengal and Northern Bengal State Railways, but the result of the experiment is not yet known. Kurz says it is used in Burma for gun-stocks, house-posts, planking, carts, furniture and cabinet-work. It stands well under water. Fuzes made from its bark are used to make slow matches. Its bark gives a good fibre for coarse, strong cordage, and is used in native medicine as an astringent.

O 208.	Garhwal (1868)	. . . . .	lbs.
O 228.	"	. . . . .	53
O 1479.	Kheri, Oudh	. . . . .	53
C 1131.	Ahiri Reserve, Central Provinces	. . . . .	59
C 2747.	Moharli Reserve "	(sapwood) . . . . .	58
E 624.	Rakti Forest, Darjeeling Terai	. . . . .	37
E 2378.	Sivoke "	. . . . .	48
E 1441.	Mishmi Hills (Griffith, 1836)	. . . . .	51
B 2703.	Tavoy (Wallich, 1822)	. . . . .	56
B 2685.	" "	. . . . .	59
B 2710.	" "	. . . . .	56
B 2228.	Andaman Islands (1866)	. . . . .	51
B 3147.	" " (Home, 1874)	. . . . .	55
No. 41.	Ceylon Collection	. . . . .	56
			38

## 7. PLANCHONIA, Bl.

1. *P. littoralis*, Van Houtte; Hook. Fl. Ind. ii. 511. *P. valida*, Blume; Kurz i. 500. Vern. *Bambway nee*, Burm.; *Baila dá*, And.

An evergreen tree. Wood reddish brown, with yellow specks, very hard, close-grained. Pores moderate-sized and large, often subdivided, in rounded and elongated patches, which are sometimes joined by narrow, undulating bands of softer tissue. Medullary rays very fine, numerous, bending. The pores are frequently filled by a yellow substance, and are prominent on a vertical section.

Evergreen coast forests of the Andaman Islands.

Weight, our specimens give 61 to 64 lbs. per cubic foot; Bennett gives 56 lbs. and  $P = 600$ . A valuable wood, which should be better known; it seasons well and takes a fine polish.

B 514.	Andaman Islands	. . . . .	lbs.
B 2495.	" "	(Home, 1874, No. 7, <i>Youaygyee</i> ) . . . . .	64
			61

## ORDER XLVII. MELASTOMACEÆ.

An Order containing 13 Indian Genera of shrubs or small trees. They are chiefly found in South India or Tenasserim. They belong to 5 Tribes, viz.,—

Tribe I.—	Osbeckiæ	. . . . .	<i>Osbeckia</i> , <i>Otanthera</i> and <i>Melastoma</i> .
" II.—	Oxysporeæ	. . . . .	<i>Oxyspora</i> , <i>Kendrickia</i> , <i>Allomorpha</i> , <i>Blastus</i> , <i>Ochthocharis</i> and <i>Anerincleistus</i> .
" III.—	Medinillæ	. . . . .	<i>Anplectrum</i> , <i>Medinilla</i> .
" IV.—	Astroniæ	. . . . .	<i>Pternandra</i> .
" V.—	Memecyleæ	. . . . .	<i>Memecylon</i> .

*Oxyspora paniculata*, DC.; Hook. Fl. Ind. ii. 525; Gamble 41 is a large handsome shrub of the Eastern Himalaya and Khasia Hills. *Memecylon* contains about

20 species of shrubs or small trees *M. umbellatum*, Burm., Beddome t 206, Kurz i 516 Vern *Udatalli* Kan is a small tree of the hills of South India African and the Andamans whose wood is said by Beddome to be like boxwood and by VanSomeren to be liable *M. edule* Roxb., Beddome exm., Kurz i 512 Vern *Alli Tel*, *Anjan*, *Kurpa* Bombay, is a small tree of the Eastern Ghats of South India, Tenasserim and the Andamans with a strong hard wood and edible fruit, while *M. amabile*, Bedd. and *M. gracile* Bedd. are small trees of the Western Ghats. The remaining genera contain shrubs or climbers of little forest interest.

## 1 OSBECKIA, Linn

Contains a number of handsome flowering herbs and shrubs of little importance.

1. *O. crinita*, Benth., Hook. Fl. Ind. ii 517 *O. stellata*, Don, Gamble 41 Vern *Number*, Lepcha.

A shrub. Bark greyish brown, smooth. Wood light brown, moderately hard. Annual rings marked by a white line and more numerous pores. Pores moderate-sized, scanty. Medullary rays crooked, fine, the distance between the rays equal to the diameter of the pores.

Eastern Himalaya and Khasia Hills from 4000 to 8,000 feet.

A very pretty shrub, common about Darjeeling.

E 3310 Darjeeling, 6500 feet.

## 2 MELASTOMA, Linn

Four Indian species.

1. *M. Malabathricum*, Linn., Hook. Fl. Ind. ii 523, Roxb. Fl. Ind. ii 405, Kurz i 503, Gamble 41. The Indian Rhododendron. Vern *Choulisy*, Nep., *Iungbam*, Lepcha, *Shapti*, *tunka*, Mechi, *Myelpyai*, Burm.

A large shrub. Bark reddish brown, thin, smooth. Wood moderately hard, light brown, with medullary patches. Pores moderate-sized, often in concentric groups, and surrounded with white tissue. Medullary rays short, fine to moderately broad, numerous, unequally distributed. Concentric bands of soft tissue often joining the pores.

Throughout India up to 6000 feet, chiefly near watercourses.

This is probably the *Luthi* bush on which according to Mr. Brownlow of Calcutta (Journal of the Asiatic Horticultural Society of Calcutta), the silkworm *Attacus Atlas* is often found and fed on which it gives a very white silk.

E 3275 Borghar Reserve, W. Duars.

## ORDER XLVIII LYTHRARIÆ

Contains 8 Indian Genera of trees or shrubs all belonging to the tribe Lythreæ. Of these 6 Genera are here described. *Pearsia aculeata*, Forst., Hook. Fl. Ind. ii 573 Beddome exm., Kurz i 519, is an evergreen shrub of the west-coast of Malabar, Tenasserim and the Andamans, while *Cropteronia paniculata* Bl., Kurz i 519 (*C. pubescens* Bl. and *C. glabra*, Bl. in Hook. Fl. Ind. ii 574) Vern *Anayfo* Burm., is an evergreen tree of the upper tropical and moist forests of Chittagong and Burma. Burha in Fiedleria list, No 113 says it has a reddish close knit straight grained wood, used occasionally for cart wheels, but more.

Medullary rays fine or very fine and very numerous.

1. *WOODFORDIA*, Salisbury.

1. *W. floribunda*, Salisb.; Hook. Fl. Ind. ii. 572; Brandis 238; Gamble 42. *W. tomentosa*, Beddome cxvii. *W. fruticosa*, Kurz i. 518. *Grislæa tomentosa*, Roxb. Fl. Ind. ii. 233. Vern. *Dáwi*, *thawí*, *sautha*, *dhaulú*, Hind.; *Gul daur*, Kangra; *Dhai*, Kumaun; *Dhewti*, Oudh; *Dhuví*, *surtári*, C.P.; *Pitta*, *petisurali*, *surteyli*, Gondi; *Khinni*, *dhi*, Kurku; *Dahiri*, *laldairo*, Nep.; *Chungkyek dum*, Lepcha; *Jatiko*, Uriya; *Jargi*, Tel.; *Phulsatti*, Mar.; *Datti*, Bhíl.

A large shrub with smooth bark, marked by longitudinal raised lines or protuberances, peeling off in thin scales. Wood reddish white, hard, close-grained. Pores small, uniformly distributed, sometimes in radial lines, medullary rays fine and very fine, closely packed.

Common throughout India, ascending to 5,000 feet in the Himalayas.

Cunningham gives weight 58 lbs.,  $P = 730$ ; our specimen weighs 46 lbs. The flowers give a red dye, which is used to dye silks.

C 2794.	Melghát, Berar							lbs.
E 876.	Chenga Forest, Darjeeling Terai	:	:	:	:	:	:	46
								...

2. *LAWSONIA*, Linn.

1. *L. alba*, Lam.; Hook. Fl. Ind. ii. 573; Beddome cxviii.; Brandis 238; Gamble 42. *L. inermis*, Linn.; Roxb. Fl. Ind. ii. 258; Kurz i. 519. The Henna Plant of Egypt. Vern. *Mehndi*, Hind.; *Dan*, Burm.; *Manghati*, Uriya; *Marithondi*, Tam.; *Goranthu*, Kan.

A shrub with thin, greyish-brown bark. Wood grey, hard, close-grained; alternate bands of tissue, with fewer and more numerous pores, which may possibly be annual rings. Pores small and joined by faint, short, interrupted concentric bands. Medullary rays fine.

Wild in Beluchistan, on the Coromandel coast and perhaps in Central India.

Cultivated throughout India as a hedge plant and for its leaves, which, powdered and made into a paste, give the "henna" dye which is used to dye the nails, skin and beard.

C 2000. Nimar, Central Provinces.

3. *LAGERSTRÖMIA*, Linn.

Contains 11 Indian species, dispersed principally over South India and Burma, while a few extend to North-East India and Assam, and one to North-West and Central India. *L. indica*, Linn.; Hook. Fl. Ind. ii. 575; Roxb. Fl. Ind. ii. 505; Kurz i. 521. Vern. *Telinga-china*, Hind., is a handsome shrub, with pink flowers, cultivated in gardens in most parts of India. *L. calyculata*, Kurz i. 522. Vern. *Pymmahpyoo*, Burm., is an evergreen tree of the Martaban Hills. *L. floribunda*, Jack., a small tree of Tenasserim and *L. villosa*, Wall.; Kurz i. 524. Vern. *Young kalay*, a deciduous tree of the forests of the Pegu Yoma and Martaban.

The pores are of different sizes, the small pores being arranged in narrow, concentric bands; which join the lines of large pores. Medullary rays uniform, equidistant, fine and numerous.

1. *L. parviflora*, Hook. Fl. Ind. ii. 575; Roxb. Fl. Ind. ii. 505; Beddome t. 31; Brandis 239; Kurz i. 521; Gamble 42. Vern. *Bákli*, *kat dhaura*, *dhaura*, *lendya*, *seina*, *sida*, *asid*, Hind.; *Sida*, Beng., Mechi, Ass.; *Borderi*, *bordengri*, Nep.; *Kauhil*, Lepcha; *Shida*, Gáro; *Shej*,

Banda, *Seji*, Byeragogarh, *Kakria*, Guz., *Sahine*, Chanda, *Chaurangi*,  
 Tel.; *Chungi*, *Vellinandi*, *Sina*,  
*lendi*, Mar.; *Sina*, *nelli*, *leria*,  
 Gondi; *Cheker*

Pores moderate-sized and large,  
 and frequently joined by narrow  
 softer texture, distinctly visible  
 rays fine, numerous.

Sub-Himalayan Tract from the Jumna eastwards, Oudh, Bengal, Assam, Central  
 and South India

The weight and transverse strength have been given by the following experi-  
 ments—

Ft	In	In	Weight	Value of F
2	1	1	found 52	757
	various	"	40	467
		"	40	"
		"	52	"

Wood tough, elastic, seasons well, works freely and is fairly durable. It coppices well.  
 Ten sleepers laid down on the Oudh and Rohilkhand Railway in 1870 were reported,

A number of sleepers are being tried on  
 result is not yet known. It is used for  
 construction, for buggy shafts and axle

It gives a very good charcoal. It gives a sweet gum from wounds in the  
 bark. The bark is used for tanning. It is one of the trees on which the "tasar"  
 silkworm is fed.

		lbs
O 232	Garhwal (1868)	15
O 2099	" (1871)	51
O 339	Gorakhpur (1868)	51
C 196	Mandla, Central Provinces (1870)	49
C 2735	} Moharli Reserve, Central Provinces	50
C 2710		
C 1110	Ahiri Reserve, Central Provinces	60
C 2769	Melghat, Bihar	51
E 666	Bamunpokri, Darjeeling Terai	52
E 2370	Sukna Forest " "	51
E 765	Kamrup, Assam	"

2. *L. lanceolata*, Beddome t. 32, Brandis 210. *L. parviflora*, Roxb.  
*rar majuscula*, C. B. Clarke, Hook. Fl. Ind. n. 575. Vern. *Bandara*,  
*nandi*, Kan.; *Nana*, *sokutia*, Mar., *Hoda*, *bondaga*, Dekkan

A large tree, with leaves bluish white beneath. Inner wood red,  
 moderately hard. Pores large and moderate-sized, joined by wavy con-  
 centric bands of soft texture, which are often interrupted. Medullary  
 rays fine, numerous, uniform, equidistant.

Forests of the Western Ghats as far north as Khandeish, Mysore and Court-  
 allum

Growth moderate, 10 rings per inch of radius. Weight, 57 lbs. per cubic foot.

		lbs
C 956	Guzerat, Bombay	57
W 1220	North Kanara	

3. *L. microcarpa*, Wight; Beddome t. 30; *L. lanceolata*, Wall;  
 Hook. Fl. Ind. n. 576. Brandis 210. Vern. *Bentek*, *rentek*, Tam.



*Ventaku*, Tel.; *Bolundūr*, *billi nandi*, Kan.; *Nāndi*, Coorg; *Nanah Mar*.

A large tree with smooth white bark, peeling off in thin flakes. Wood red, moderately hard. Pores large and small, often subdivided and frequently joined by narrow, irregular, wavy bands and lines of softer texture. Medullary rays extremely fine, very numerous. Distinct white concentric lines, which probably indicate the annual rings. Pores marked on a longitudinal section and medullary rays visible on a radial section as numerous narrow plates.

Western forests of the Madras Presidency.

Growth moderately fast, 6 to 8 rings per inch of radius. The weight and transverse strength have been determined as follows:

Experiment by whom conducted.	Year.	Whence procured.	Number of experiments.	Size of bar.	Weight.	Value of P.
				Ft. In. In.		
Skinner No. 85 . . .	1862	.....	.....	Various	41	619
Puckle . . . . .	1859	Mysore	5	2×1×1	41	939
List . . . . .	1863	"	.....	.....	39	.....
Balfour . . . . .	...	Malabar	3	7×2×2	49	542
Smythies . . . . .	1878	South Kanara	2	.....	48	.....

Much used in construction and for ship-building, also for coffee-cases, and for furniture.

W 765.	South Kanara	.	.	.	.	.	.	.	lbs.
W 862.	"	"	.	.	.	.	.	.	48
			.	.	.	.	.	.	48

4. *L. Regina*, Roxb. Fl. Ind. ii. 505; Beddome t. 29; Brandis 240. *L. Flos-Régina*, Retz; Hook. Fl. Ind. ii. 577; Kurz i. 524. Vern. *Jarúl*, Beng.; *Ajhar*, Ass.; *Bolashari*, Gáro; *Kadali*, Tam.; *Challá*, Kan.; *Adamhoe*, Mal.; *Taman*, *mota bondara*, Mar.; *Kamaung*, Magh; *Pymma*, Burm.; *Murute*, Cingh.

A large deciduous tree. Bark smooth, grey to cream-coloured. Wood shining, light red, hard; annual rings marked by a belt of large pores. Pores of all sizes from extremely small to large, the latter often subdivided, joined by narrow, wavy and often anastomosing concentric bands of soft tissue, which contain the smaller pores. Medullary rays very or extremely fine, often indistinct. The wood in Burma is frequently very porous with an abundance of large pores.

Eastern Bengal, Assam, Burma and Western Coast, extending north to Ratnagiri.

Growth moderate; our specimens show 7 rings per inch of radius. In 1876 Mr. Fisher measured 5 trees in the Sidli Forest, Goalpara district, Assam. The results were, on an average—

	In.	In.	In.	In.	In.
On a length of radius equivalent to a girth of 18	36	54	72	90	
No. of rings . . . . .	15	25	39	51	66

On an average, therefore, the number of rings per inch of radius is 4·6; and the tree appears to add a cubit to its girth every 13 years on an average. The weight and transverse strength have been determined by the following experiments.

Experiment by whom conducted	Year	Wood whence procured	Number of experiments	Size of bar		Weight	Value of P
				Ft	In	In	lbs
Wallch		India					48.5
Adrian Mendis	1853	Ceylon					42
Baker	1879	Bengal	11	2	1	1	850
Skinner No 87	1862	South India					40
Kyd	1831	Assam		2	1	1	37
							39
							38
							33 1/2
Benison		Burma		3	1 1/4	1 1/4	33
Forbes Watson				3	1 1/2	1 1/2	36
Brandis, Nos 61 & 62	1860						40.5*
	1864		4	7	"	2	47
Commissariat Department		Moulmein					39
Fmythies	1873	As below	10				43

\* Average of 37 and 41.

The most valuable timber of Sylhet Cachar and Chittagong and in Burma the most valuable after teak. It is kinds of construction timber parts of their gun carriages casks. It gives a resin. It India and even as far north as Lahore.

E 620	Eastern Duars	Assam		lbs
L 1228	Sibangar	Assam		43
E 2188	Nowgong	Assam		40
F 1272	Cachar	"		40
E 410	Sundarbans			38.5
F 710	Chittagong			47
W 726	South Kanara			47
B 808	Pegu			46
B 3067	Burma (1862)			39
B 2717	Tavoy (Wallich 1828)			40
				43

5 *L. macrocarpa*, Wall., Kurz: 524 *L. Flos Reginae*, Retz, Hook. f. India: 577 *Vern. Jarul*, Beng., *Koonpummah*, Burm.

A moderate sized deciduous tree. Wood red, moderately hard, in structure resembling that of *L. Reginae*, but the bands of white tissue more prominent and large pores fewer.

Burma in Pegu and Martaban

Weight 45 to 49 lbs per cubic foot

B 296	Burma (1867)	lbs
B 3068	(1862)	49
		45

6 *L. hypoleuca*, Kurz: 523, Hook. f. India: 577 *Vern. Pymmah* Burm., *Piddi*, And.

A large deciduous tree with thin whitish bark. Wood red, hard. Pores very small to very large, in fine, wavy, concentric, anastomosing, but sometimes interrupted lines of softer tissue, alternating with darker wood of firmer texture, in which the very fine medullary rays are distinctly visible.

Andaman Islands

Growth slow 10-18 rings per inch of radius. Weight 41 to 50

Major Protheroe; our specimens give an average of 39 to 40 lbs.; Bennett gives 41 lbs. and  $P = 570$ . The wood is used largely in the Andamans for building, shingles and other purposes.

B 510.	Andaman Islands	lbs.
B 2202.	" " (1866)	45
B 2274.	" " "	38
B 2283.	" " "	34
B 2496.	" " (Home, 1874, No. 2)	44

7. *L. tomentosa*, Presl; Hook. Fl. Ind. ii. 578; Kurz i. 522. Vern. *Laiza*, Burm.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, grey. Wood grey or greyish brown, close-grained, moderately hard. Pores from very small to very large, the latter often subdivided, joined by numerous concentric lines, alternating with broad bands of firmer tissue, in which the fine medullary rays are prominent.

Burma. Frequent in Pegu and Martaban.

Weight, according to Brandis' Catalogue, 1862, No. 59 (*L. pubescens*, Wall.), 53 lbs.; Brandis' 3 experiments in 1864 with bars 3 ft.  $\times$  1 inch  $\times$  1 inch gave: Weight 38 lbs. and  $P = 588$ . Our specimens give 46 and 53 lbs. The timber is valued for bows and spear handles, and is also used for canoes and cart-wheels.

B 572.	Prome	lbs.
B 2533.	Burma (1862)	53

#### 4. DUABANGA, Ham.

1. *D. sonneratioides*, Buch.; Kurz i. 525; Gamble 42. *Lagerströmiæ grandiflora*, Roxb. Fl. Ind. ii. 503. Vern. *Bandorkhulla*, Beng.; *Lampatia*, Nep.; *Dúr*, Lepcha; *Kochan*, *kokan*, Ass.; *Jarúl-jhalna*, Cachar; *Bondorkella*, *bolchim*, Gáro; *Baichua*, Magh; *Myouknau*, Burm.

A lofty deciduous tree, with light-brown bark, peeling off in thin flakes. Wood grey, often streaked with yellow, soft, seasons well, neither warps nor splits. Pores large and moderate-sized, often oval and subdivided, uniformly distributed. Medullary rays fine, very numerous, wavy. Pores well marked on a longitudinal section.

Eastern Bengal ascending to 3,000 foot, Assam and Burma.

Growth fast, 5 rings per inch of radius. Weight, according to Brandis' Burma List of 1862, No. 64, 30 lbs. per cubic foot; our specimens give an average of 32 lbs. The wood does not warp or split, and canoes cut out of it green are at once used, even when liable alternately to wet and the heat of the sun. Is used in Northern Bengal and Assam very extensively for tea-boxes, for which purpose it is admirably fitted. It is also made into canoes and cattle troughs. The seeds are extremely small and the seedlings very minute at first, but the growth is very fast. Seedlings at the Bamunpokri Plantation in Bengal, which had come up on the sites of old charcoal kilns (see "Indian Forester," Vol. iv. page 345), attained a height of 10 feet in two years, with proportionate girth and fine spreading branches.

E 652.	Rakti Forest, Darjeeling Terai	lbs.
E 2380.	Sukna Forest, Darjeeling Terai	32
E 950.	Eastern Dúars, Assam	32
E 1230.	Sibságar, Assam	36
E 1436.	Assam	29
E 1285.	Cachar	32
E 1499.	Sylhet	31
E 713.	Chittagong	30
B 807.	Pegu	21
B 1995.	Andamans (Kurz, 1866) (young tree)	21



## 1. CASEARIA, Jacq.

Nine Indian species. *C. Vareca*, Roxb. Fl. Ind. ii. 418; Hook. Fl. Ind. ii. 593; Kurz i. 530; Gamble 43, is an evergreen shrub of the banks of streams in Northern and Eastern Bengal. *C. esculenta*, Roxb., *C. rubescens*, Dalz.; Beddome t. 41, and *C. wynaadensis*. Beddome exx., are small trees of the forests of the Western Ghâts. *C. Kurzii*, C. B. Clarke; Hook. Fl. Ind. ii. 594, is a tree of Chittagong.

Wood yellowish white, moderately hard, rough. Medullary rays fine, numerous. Pores small or very small, often in radial groups or lines.

1. *C. tomentosa*, Roxb. Fl. Ind. ii. 421; Hook. Fl. Ind. ii. 593; Beddome exix.; Brandis 243. Vern. *Chilla*, *chilara*, *bairi*, *bhari*, Hind.; *Mann*, Manbhúm; *Men*, *vasa*, *gamgudú*, Tel.; *Lainja*, *massei*, *karei*, Mar.; *Girari*, Uriya; *Thundri*, Gondi; *Khesa*, Kurku.

A small tree. Bark  $\frac{1}{2}$  inch thick, brittle, exfoliating in more or less square flakes. Wood yellowish white, moderately hard, rough, close-grained. Pores small and very small, sometimes in radial lines. Medullary rays fine and very fine, wavy, equidistant, very numerous.

Sub-Himalayan tract from the Indus eastwards, Oudh, Eastern Bengal, Central and South India.

Weight, 41 lbs. per cubic foot. Wood used to make combs. The bark is bitter; it is used for adulterating the "Kamela" powder and the pounded fruit for poisoning fish.

	lbs.
O 1393. Gonda, Oudh . . . . .	41
O 3085. " " . . . . .	...
O 3089. Kheri, Oudh . . . . .	...
C 1183. Ahiri Reserve, Central Provinces . . . . .	41
C 2302. Melghát, Berar (young) . . . . .	38

2. *C. graveolens*, Dalzell; Hook. Fl. Ind. ii. 592; Brandis 243. Vern. *Chilla*, *náro*, *kathera*, *pimpri*, Hind.; *Girchi*, Gondi; *Rewat*, Kurku.

A small deciduous tree. Bark dark grey, with a few longitudinal wrinkles. Wood light yellow, moderately hard, rough, even-grained. Pores small, often oval and subdivided. Medullary rays fine, equidistant, very numerous, visible as shining plates on a radial section.

Sub-Himalayan tract from the Chenab eastwards, Oudh, Central India.

Weight, 40 to 50 lbs. Wood not used; the fruit is used to poison fish.

	lbs.
O 240. Garhwal (1868) . . . . .	42
O 271. " " . . . . .	40
O 1456. Bahraich, Oudh . . . . .	49
O 3090. Kheri, Oudh . . . . .	...

3. *C. glomerata*, Roxb. Fl. Ind. ii. 419; Hook. Fl. Ind. ii. 591; Kurz i. 530; Gamble 42. Vern. *Lúrjúr*, Sylhet; *Burgonli*, Nep.; *Sugvat*, Lepcha.

A large evergreen tree. Wood yellowish white, moderately hard, rough. Pores small, in radial lines. Medullary rays of two sizes; numerous very fine rays between fewer moderately broad, giving on a radial section a beautifully mottled appearance.

Eastern Bengal ascending to 6,000 feet, Chittagong.

Weight, 45 to 48 lbs. per cubic foot. Wood used for building, charcoal and occasionally for tea-boxes.

E 691	Chuttockpur Forest, Darjeeling, 6 000 feet	lbs
E 2331	" " " "	48
		45

## 2 HOMALIUM, Jacq

Contains eight trees, chiefly Burmese *H zeylanicum* Bth, Hook Fl Ind ii 596, Beddome t 210, and *H travancoricum* Beddome t 211, are large trees of the Western Ghats *H minutiflorum*, Kurz i 532 *H propinquum*, C B Clarke, Hook Fl Ind ii 597, and *H Griffithianum* Kurz i 531 are small trees of Burma *H Schlichii*, Kurz i 532, is an evergreen tree of the tropical forests of Chittagong, and *H nepalense*, Bth, is found in Nepal

1. *H. tomentosum*, Bth, Hook Fl Ind ii 596, Brandis 243, Kurz i 531 *Blackwellia tomentosa*, Vent, Brandis' Burma Catalogue, 1862, No 58 Vern *Myonkshaw*, Burm

A large deciduous tree with thin, very smooth, white or greyish white bark Wood brown, with dark coloured heartwood, very hard, heavy and close-grained, splits in seasoning Pores small, in radial lines between the closely-packed and fine medullary rays, which are bent outwards where they touch the pores The distance between the rays is less than the transverse diameter of the pores

Chittagong and Burma

Weight Brandis in Burma List, 1862 No 58, gives 56 lbs His experiments made in 1864 were as follows

No	Size of bar	Weight	Value of P
2	3 × 1 × 1'	53	880
3	2 × 1' × 1	54	868

Our specimens give an average of 58 lbs This may be the wood experimented on by Skinner, No 53 (see also under *Dalbergia lanceolaria* p 128) Weight 62 lbs, P=1003 He calls it "Moulmein lancewood" and *Myonkshaw* The wood is durable and is used for the teeth of harrows and for furniture

B 331	Burma (1866)	lbs
B 2534	(1862)	63
B 2692	Taroy (Wallich, 1828)	50
B 2693	" " "	61
B 2702	" " "	64
		55

## ORDER L PASSIFLOREÆ

Only one species *Carica Papaya*, Linn, Roxb Fl Ind iii 824, Brandis 244, Kurz i 533, Gamble 43 The Papaw Tree Vern *Papaya*, Hind, *Perinj* kan, *Thambawthee*, Burm, is a small, soft wooded, fast growing tree which was introduced from South America, and is now cult ext

## ORDER LI DATISCEÆ.

Two Genera. *Datisca cannadina* Linn, Hook Fl Ind ii 656 Vern *Alalbir*, *Shangjals*, Hind, is a tall, erect herb resembling hemp and found in the Punjab Himalaya It gives a red or yellow dye

## 1. TETRAMELES, R. Br.

1. *T. nudiflora*, R. Br.; Hook. Fl. Ind. ii. 657; Beddome t. 212; Brandis 245; Kurz i. 535; Gamble 43. Vern. *Mainakat*, Nep.; *Pajomko*, Lepcha; *Bolong*, Gáro; *Sandugaza*, Beng.; *Tschipoban*, Magh; *Thilponk*, Burm.; *Bolur*, Kan.

A very large deciduous tree, with cylindrical, often much-buttressed stem. Bark grey-brown, wrinkled. Wood white, very light, soft. Annual rings marked by a belt of closer pores. Wood cells large. Pores large, often in short, zigzag, transverse lines. Medullary rays fine to moderately broad, clearly marked, the distance between the rays equal to the diameter of the pores.

Sikkim, Gáro Hills, Chittagong, Western Gháts, Burma and the Andamans. Growth very fast. The wood may be found useful for tea-boxes.

E 3288. Rinkheong Reserve, Chittagong.

## ORDER LII. CACTEÆ.

Contains only the Prickly Pear, *Opuntia Dillenii*, Haw.; Hook. Fl. Ind. ii. 657; Brandis 245 (*Cactus indicus*, Roxb. Fl. Ind. ii. 475.) Vern. *Nágphana*, *nágphansi*, Hind.; *Pápásh kalli*, Kan.; *Chaffal send*, Dekkan. An erect, fleshy, thorny shrub common all over the arid and dry zones of India and often planted as a hedge. The stems have been used in time of scarcity as fodder. It was originally brought from America.

## ORDER LIII. ARALIACEÆ.

Contains 16 Genera of usually small, soft-wooded trees or shrubs, erect or climbing. They are divided into four Tribes, viz.,—

Tribe	I.—Araliæ	. . . . .	<i>Aralia</i> and <i>Pentapanax</i> .
„	II.—Panaceæ	. . . . .	<i>Acanthopanax</i> , <i>Helwingia</i> , <i>Polyscias</i> , <i>Heptapleurum</i> , <i>Trevesia</i> , <i>Brassaia</i> and <i>Dendropanax</i> .
„	III.—Hederææ	. . . . .	<i>Arthrophyllum</i> , <i>Heteropanax</i> , <i>Brassaiopsis</i> , <i>Macropanax</i> , <i>Hedera</i> and <i>Gamblea</i> .
„	IV.—Plerandree	. . . . .	<i>Tupidanthus</i> .

*Aralia* contains 6 shrubs or small trees, the chief of which are *A. foliolosa*, Seem., and *A. armata*, Seem. Vern. *Somri*, Nep.; *Kajyang*, Lepcha, small trees of the hills of the N.E. Himalaya with large 2-3 pinnate leaves, prickly stems and the general aspect of tree ferns. *A. cackemirica*, Dene.; Brandis 248, is a shrub of the higher elevations of the Himalaya from Kashmir to Sikkim. *Pentapanax* contains 4 species of usually climbing epiphytic shrubs: *P. Leschenaultii*, Seem., *P. subcordatum*, Seem., and *P. racemosum*, Seem., are large climbers of the Sikkim Hills. *Acanthopanax aculeatum*, Seem., is a shrub of the Khasia Hills. *Polyscias acuminata*, Wight; Beddome t. 213, is a tree of the hills of South India above 4,000 feet elevation. *Trevesia palmata*, Vis.; Hook. Fl. Ind. ii. 732; Kurz i. 539; Gamble 44. (*Gastonia palmata*, Roxb. Fl. Ind. ii. 407.) Vern. *Kajpati*, Nep.; *Suntong*, Lepcha; *Barv*, Burm., is an evergreen palm-like tree with large palmate leaves and big fruit, found in the Eastern Himalaya, Eastern Bengal and Burma. *Brassaia capitata*, C. B. Clarke; Hook. Fl. Ind. ii. 732, is a tree of the Nilgiri Hills. *Arthrophyllum diversifolium*, Bl.; Hook. Fl. Ind. ii. 733. (*A. javanicum*, Bl.; Kurz i. 540), is an evergreen palm-like tree of the Andamans. *Heteropanax fragrans*.

Seem, Hook Fl Ind ii, 731, Brandis 249, Kurz 541, Gamble 41. Vern. *Lal totilla*, Nep, *Sirokhtem*, Lepcha, *Kesseru*, Assam, *Hona*, Cachar; *Tachansa*, Burm, is a small tree of the sub-Himalayan tract from Kumaun to Assam, Eastern Bengal, Chittagong and Burma. It is important as being a tree upon whose leaves, as well as on those of the Castor Oil plant, the "Eri" silkworm of Assam (*Attacus Ricini*) is fed. *Tupidanthus calypttratus*, H. f. and Th, is an evergreen scandent tree of the eastern slopes of the Arracan Yoma.

The Chinese rice-paper is the pith of *Aralia papyrifera*, Hk, a tree of Formosa.

Wood white, generally soft. Pores small, often arranged in concentric bands. Medullary rays distant, broad or moderately broad, generally several lines of pores between two rays.

### 1. HELWINGIA, Willd.

1. *H. himalaica*, Hook. f and Th.; Hook. Fl. Ind ii 726; Gamble 44. Vern. *Lubbor*, Lepcha.

A large shrub. Wood white, moderately hard, pith large. Pores very small, arranged in groups or short concentric lines. Medullary rays short, fine to moderately broad.

Eastern Himalaya, above 7,000 feet, Khasia Hills.

A curious shrub with simple leaves and flowers in umbels from the centre of the leaves, like those of *Ruscus*.

E 3312 Darjeeling, 7,000 feet.

### 2. HEPTAPLEURUM, Gaertn.

Contains about 10 trees or climbers, among which 6 species occur in South India, 2 in Burma and 1 in the Sikkim Himalaya. *H. impressum*, C. B. Clarke, Hook Fl Ind ii 728 (*H. tomentosum*, Ham, Gamble 41). Vern. *Baloo chinia*, Nep, *Sirokhtem*, Lepcha, *Kesseru*, Assam, *Hona*, Cachar; *Tachansa*, Burm, is a small tree of the sub-Himalayan tract from Kumaun to Assam, Eastern Bengal, Chittagong and Burma.

and Ceylon. *H. rostratum*, Beddome exii, and *H. Wallichianum*, C. B. Clarke, are trees of the Western Ghats. *H. renulosum*, Seem, Brandis 249, Kurz 538, Gamble 41 (*Aralia digitata*, Roxb Fl Ind ii 107). Vern. *Dain*, Hind; *Singkata*, Nep, is a climbing shrub or small tree of most parts of India.

1. *H. elatum*, C. B. Clarke, Hook. Fl. Ind. ii. 728, Gamble 41. Vern. *China*, Nep; *Prongzam*, Lepcha.

A tree. Bark  $\frac{1}{4}$  in thick, greyish brown. Wood white, soft. Structure similar to that of *Mucropanax undulatum*.

Himalaya, from Kumaun to Bhutan, between 5,000 and 7,000 feet.

E 3326 Rangirum, Darjeeling, 6,000 feet.

### 3. BRASSAIOPSIS, Dene and Planch.

Contains several small palm like trees of the Eastern Himalaya, Eastern Bengal and Burma. *B. palmata* Kurz 537, is found in the forests of Chittagong and the Andamans and *B. Hainla*, Seem, Hook Fl Ind. ii 735, Gamble 41. Vern. *Tiketter*, Nep, *Sustony*, Lepcha, is a common small tree in the forests of the outer Sikkim Himalaya.



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Sikkim, Gáro Hills, Chittagong, Western Gháts, Burma and the Andamans. Growth very fast. The wood may be found useful for tea-boxes.

E 3288. Rinkheong Reserve, Chittagong.

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„	II.—Panacæ	.	.	.	.	.	<i>Acanthopanax</i> , <i>Helwingia</i> , <i>Polyscias</i> , <i>Heptapleurum</i> , <i>Trevesia</i> , <i>Brassaia</i> and <i>Dendropanax</i> .
„	III.—Hederæ	.	.	.	.	.	<i>Arthrophyllum</i> , <i>Heteropanax</i> , <i>Brassaiopsis</i> , <i>Macropanax</i> , <i>Hedera</i> and <i>Gamblea</i> .
„	IV.—Plerandreræ	.	.	.	.	.	<i>Tupidanthus</i> .

*Aralia* contains 6 shrubs or small trees, the chief of which are *A. foliolosa*, Seem., and *A. armata*, Seem. Vern. *Somri*, Nep.; *Kajyang*, Lepcha, small trees of the hills of the N.E. Himalaya with large 2-3 pinnate leaves, prickly stems and the general aspect of tree ferns. *A. cachemirica*, Dene.; Brandis 248, is a shrub of the higher elevations of the Himalaya from Kashmir to Sikkim. *Pentapanax* contains 4 species of usually climbing epiphytic shrubs: *P. Leschenaultii*, Seem., *P. subcordatum*, Seem., and *P. racemosum*, Seem., are large climbers of the Sikkim Hills. *Acanthopanax aculeatum*, Seem., is a shrub of the Khasia Hills. *Polyscias acuminata*, Wight; Beddome t. 213, is a tree of the hills of South India above 4,000 feet elevation. *Trevesia palmata*, Vis.; Hook. Fl. Ind. ii. 732; Kurz i. 539; Gamble 44. (*Gastonia palmata*, Roxb. Fl. Ind. ii. 407.) Vern. *Kajpati*, Nep.; *Suntong*, Lepcha; *Baw*, Burm., is an evergreen palm-like tree with large palmate leaves and big fruit, found in the Eastern Himalaya, Eastern Bengal and Burma. *Brassaia capitata*, C. B. Clarke; Hook. Fl. Ind. ii. 732, is a tree of the Nilgiri Hills. *Arthrophyllum diversifolium*, Bl.; Hook. Fl. Ind. ii. 733. (*A. javanicum*, Bl.; Kurz i. 540), is an evergreen palm-like tree of the Andamans. *Heteropanax fragrans*,

Seem, Hook Fl Ind n, 731, Brandis 219, Kurz 511, Gamble 41 Vern *Yal totilla*, Nep, *Sirokhtem*, Lepcha, *Kessera*, Assam, *Hona*, Cachar, *Tachansa*, Burm, is a small tree of the sub Himalayan tract from Kumaun to Assam, Eastern Bengal, Chittagong and Burma. It is important as being a tree upon whose leaves as well as on those of the Castor Oil plant, the "Er" silkworm of Assam feeds. Th. is an evergreen.

a tree of Formosa

Wood white, generally soft. Pores small, often arranged in concentric bands. Medullary rays distant, broad or moderately broad, generally several lines of pores between two rays.

## 1 HELWINGIA, Willd

44 1. *H. himalaica*, Hook f and Th, Hook Fl Ind n 726; Gamble  
Vern *Lubhor*, Lepcha

A large shrub. Wood white, moderately hard, pith large. Pores very small, arranged in groups or short concentric lines. Medullary rays short, fine to moderately broad.

Eastern Himalaya above 7 000 feet, Khasia Hills

A curious shrub with simple leaves and flowers in umbels from the centre of the leaves, like those of *Ruscus*

E 3312 Darjeeling, 7,000 feet

## 2 HEPTAPLEURUM, Gaertn

Contains also  
2 in Burma and  
Ind n 728

Dep. is a climbing shrub or small tree of most parts of India

1. *H. elatum*, C. B. Clarke, Hook. II Ind. n. 728, Gamble 41.  
Yam China, Nep., Prongzam, Lepcha

A tree. Bark  $\frac{1}{4}$ -1 in thick, greyish brown. Wood white, soft. Structure similar to that of *Macropanax undulatum*.

Himalaya, from Kumaun to Bhutan, between 5,000 and 7,000 feet.

E 3326 Rangirum, Darjeeling, 6,000 feet

## 3. BRASSAIOPSIS, Dunc and Planch.

Contains a veral small palm like trees of the Eastern Himalaya, Eastern Bengal and Burma. *B. palmata* Kurz. 537, is found in the forests of Chittagong and at Anlamian and *B. Hainla* Seem, Hook. f. Ind. n. 733, Gamble 41. Very thickset, Nep., Szech'ang, Loocha is a common small tree in the forests of the outer Sikkim Himalaya.

1. *B. mitis*, C. B. Clarke; Hook. Fl. Ind. ii. 736. *B. sp.*; Gamble 44. Vern. *Mogchini*, Nep.; *Suntong*, Lepcha.

A small tree with thin grey bark, and soft, white, spongy wood. Pores small, in groups and undulating lines. Medullary rays short, broad and very fine, marked on a radial section as shining plates.

Sikkim Himalaya, above 5,000 feet, common at Darjeeling.

Growth moderately fast, 5 rings per inch of radius. Weight, 24 lbs. per cubic feet.

E 2382.	Rangbúl Forest, Darjeeling, 7,000 feet	. . . . .	lbs.
			24

#### 4. MACROPANAX, Miq.

Besides the species described, *M. oreophilum*, Miq.; Kurz i. 541, is an evergreen tree of the forests of the Martaban Hills above 5,000 feet.

1. *M. undulatum*, Seem.; Gamble 45. Vern. *Chinia*, Nep.; *Prongzam*, Lepcha.

A moderate-sized evergreen tree; wood soft, yellowish white, even-grained. Pores small, numerous. Medullary rays broad, often with a few fine rays intervening, prominent on a radial section as shining plates giving the wood an elegant reticulate appearance. The distance between the rays is many times larger than the diameter of the pores, there being many lines of pores between each pair of rays.

Eastern Himalaya, up to 5,000 feet.

Weight, 30 lbs. per cubic foot.

E 688.	Chuttockpur Forest, Darjeeling, 6,000 feet	. . . . .	lbs.
			30

#### 5. HEDERA, Linn.

1. *H. Helix*, Linn.; Brandis 248; Gamble 45. The Ivy. Vern. *Halbambar*, *arbambal*, Jhelum; *Karmora*, *mandia*, Kashmir; *Kuröl*, Chenab; *Kuri*, *karúr*, Ravi; *Brámbrúm*, *dakári*, Beas; *Karbaru*, *kaniúri*, *kadeoli*, Sutlej; *Bánda*, Kumaun; *Dudela*, Nep.

A large woody climber. Wood white, soft, porous. Annual rings marked by a broad belt of pores and by less numerous pores in the autumn wood. Pores small, very numerous. Medullary rays short, moderately broad.

Himalaya from the Indus to Bhutan, between 3,000 and 9,000 feet; Khasia Hills.

Growth slow, 22 rings per inch of radius. Weight, our specimen gives 34 lbs.; Mathieu Fl. For. p. 174, gives 27 to 44 lbs.

H 69.	Mashobra, Simla, 7,000 feet	. . . . .	lbs.
H 3010.	Kotgarh, Simla, 7,500 feet	. . . . .	34

### ORDER LIV. CORNACEÆ.

Contains 7 Genera of Indian trees or shrubs. They are generally dispersed over India, but are chiefly found in the Himalayas. They may be divided into two sections—

Section I.—With hermaphrodite flowers . *Alangium*, *Marlea*, *Cornus* and *Mastixia*.

„ II.—With diceious flowers . . *Aucuba*, *Nyssa* and *Torricellia*.

*Mastixia arborescens* Wight, Beddome t 216 is a tree of the forests of the Western Ghâts between 2000 and 7000 feet *Torreellia tiliaefolia* DC Gamble 15 is a small tree of the Eastern Himalaya between 6000 and 10000 feet *Nyssa sessiliflora*, Hook f and Th is found in the Eastern Himalaya and Khasia Hills

Wood close grained, apt to warp Pores generally small or very small Medullary rays fine and numerous

## 1 ALANGIUM, Lam

Contains two species one of which is here described *A. Sindarum* Miq Vern *Agnara* And is an evergreen climbing shrub of the tropical forests of the Andamans

1 *A. Lamarckii*, Thwaites, Beddome t 215, Brandis 250. *A. hexapetalum*, Roxb Fl Ind ii 502 *A. decapetalum*, Lam, Kurz 1 518 Vern *Alola*, *thaila*, Hind, *Alar-kanta*, *bagh ankura*, Beng, *Alangi*, Tam, *Urgu*, *udagu*, Tel, *Ankola*, Kan, *Uru*, Gondi

A deciduous shrub or small tree Bark  $\frac{1}{2}$  inch thick, grey. Sapwood light yellow, heartwood brown, hard, close and even-grained Pores small, scanty, in radial lines between the fine, closely packed medullary rays, which often bend outwards, the transverse diameter of the pores being slightly larger than the distance between the rays

Sib-Himalayan tract from the Ganges eastwards Oudh Bengal Central and South India

Weight according to Skinner, Sk n r gives P=870  
ells and other purposes  
aten and the bark used in

native medicine

C 3116 Chanla Central Provinces

114

D 1082 North Arcot Madras

56

13

## 2 MARLEA, Roxb

Besides the species here described *M. tomentosa* Fendl, Kurz 1 515 Vern *Gorapongse* Burm., is a large evergreen tree of the tropical forests of Martaban said by Kurz to have a pale brown close grained wood with a silvery lustre

1 *M. begoniifolia*, Roxb Fl Ind ii 261, Brandis 251, Kurz 1 511, Gamble 15 Vern *Garkum*, *budhal*, *tumbri*, North-Western Provinces, *Bodara*, *Beas*, *Sialu*, *Chenab*, *Prot*, *Kashmir*, *Tilpattra*, *chitpittra*, *kurkui*, *Jhelum*, *Tumri*, *Kumaun*, *Timil*, *Nep*, *Palet*, *Lapcha*, *Tipuya*, *Burm*, *Marlea*, *riarhi-a*, *Sylhet*

A small tree, with smooth, thin, grey bark Wood white, soft, even-grained Annual rings marked by a belt of numerous pores Pores moderate sized and large, small in the outer portion of each ring Medullary rays short, wavy, fine and moderately broad, prominent on a radial section

Outer Himalaya from the Indus to Bhutan ascending in the North West to 6000 feet and in Sikkim to 9000 feet, Khasia Hills Eastern Bengal Chittagong and Marala

Growth moderately fast 5 rings per inch of radius Weight 12 lbs per cubic foot

The wood is used for native houses in Sylhet. The leaves are sometimes given as fodder to cattle.

H 2831.	The Glen, Simla, 6,000 feet	. . . . .	lbs.
			42

### 3. CORNUS, Linn.

Besides the three species here described, *C. sanguinea*, Linn.; Brandis 253, the Dogwood, was found by Dr. Stewart in the Punjab Himalaya at 7,000 feet.

Numerous small pores and numerous fine medullary rays, often of different width.

1. *C. macrophylla*, Wall.; Brandis 252; Gamble 45. Vern. *Kasír*, *kachír*, *halco*, *allian*, *haddú*, *harru*, *nang*, *kandara*, *kaksh*, *kachúr*, *kochan*, *kágsha*, *úchia*, Hind.; *Patmoro*, Nep.

A small tree, with rough, brown bark, splitting into small squares. Wood pinkish white, hard, close-grained, warps badly and has an unpleasant scent. Annual rings marked by a narrow line without pores, on the outer edge of each ring. Pores small, numerous. Medullary rays short, moderately broad, with fewer fine rays, giving the wood on a radial section a beautifully mottled appearance.

Himalaya from the Indus to Bhutan, between 3,000 and 8,000 feet.

Growth moderate, 8 to 9 rings per inch of radius (Brandis); our specimens had 15 rings. Weight, 41 lbs. per cubic foot. The wood gives good gunpowder charcoal. The fruit is eaten and the leaves given as fodder to goats.

H 84.	The Glen, Simla, 6,000 feet	. . . . .	lbs.
			45
H 924.	Hazara, 6,000 feet	. . . . .	43

2. *C. oblonga*, Wall.; Brandis 253; Kurz i. 545. Vern. *Kagshi*, *Sutlej*; *Dab*, Kunawar; *Kasmol*, *bakár*, *ban-bakúr*, *halá*, Hind.

A small tree, with reddish brown, rough bark. Wood pinkish white, hard, even-grained, warps and has an unpleasant scent. Annual rings marked by a belt without pores at the outer edge of each ring. Pores small, numerous. Medullary rays fine, very numerous, with a few slightly broader ones.

Outer Himalaya from the Indus to Bhutan, between 3,000 and 6,000 feet; Martaban Hills in Burma, between 4,000 and 7,000 feet (Kurz).

Growth moderate, 10 rings per inch of radius. Weight, 48 lbs. per cubic foot.

H 150.	Sainj, Giri Valley, 4,000 feet	. . . . .	lbs.
			46
H 3094.	Tarwa Forest, Julung, Simla, 4,000 feet	. . . . .	50

3. *C. capitata*, Wall.; Brandis 253; Gamble 45. *Benthamia fragifera*, Lindley. Vern. *Thammal*, *tharbal*, *tharwar*, *thesi*, *bamaur*, *bamora*, Hind.; *Tumbúk*, Lepcha.

A small deciduous tree, with thin, greyish brown bark. Wood whitish, with reddish brown heartwood, warps in seasoning, very hard, close-grained. Pores very small. Medullary rays numerous, moderate-sized and fine.

Himalaya from the Beas to Bhutan, between 3,500 and 8,000 feet; Khasia Hills.

Growth slow, 16 rings per inch of radius. Weight, 45 lbs. per cubic foot. The wood is used only for firewood. This is probably the *Cornus*, *sp.*, of whose wood 5

45

1b  
55

L. 3133 Mangwa Forest Darjeeling 5000 feet

## 2. VIBURNUM, Linn.

Contains about 15 species, mostly Himalayan. Three species occur in the Nilgiris, seven in the North-West Himalaya, and about twelve in the Eastern Himalaya and Khasia Hills.

*V. corylifolium*, Hook. f. and Th.; Gamble 46, is a small tree of Sikkim and the Khasia Hills. *V. nervosum*, Don; Brandis 259. Vern. *Ambre*, *amrola*, *ari*, Ravi; *Ris*, *dáb*, Beas; *Thilkain*, *thalein*, Sutlej, is a shrub of the Himalaya above 7,000 feet, from Kumaun to Sikkim. *V. cordifolium*, Wall. and *V. punctatum*, Ham.; Beddome t. 217; Brandis 260; Gamble 46, are shrubs of the Outer Himalaya from Kumaun to Bhutan, the latter occurring also in the Western Gháts. *V. involucratum*, Wall.; Gamble 46, Vern. *Gorakuri*, Nep., is a shrub of the Himalaya, chiefly eastern. *V. fœtidum*, Wall., *V. odoratissimum*, Ker, and *V. Simonsii*, Hook. f. and Th., are all from the Khasia Hills. *V. hebanthum*, W. and A.; Beddome cxxiv., is a small tree of the Western Gháts and Ceylon.

The Guelder Rose, cultivated in gardens in Europe, is *V. Opulus*, Linn., and the Laurustinus is *V. Tinus*, Linn., indigenous in the Mediterranean region.

Bark thin. Wood hard and close-grained, characterised by very numerous, very fine medullary rays and very small pores. Annual rings indistinctly marked, generally by a narrow line of firmer wood. The wood of *V. lutescens* is softer, the pores larger, and the annual rings not visible.

All species here described, with the exception of *V. erubescens* and *V. lutescens*, are marked by distinct and numerous medullary patches, visible on the horizontal and vertical sections. The European species, both those with deciduous leaves, *V. Opulus* and *V. Lantana*, and the evergreen *V. Tinus* have no medullary patches.

1. *V. cotinifolium*, Don; Brandis 258. Vern. *Marghwalawa*, Trans-Indus; *Rich úklu*, *bankúneh*, Jhelum; *Richabi*, *kilmich*, *gúch*, Kashmir; *Bathor*, *pápat kalam*, *khímor*, *rájal*, *tumma*, Chenab; *Kátonda*, Ravi; *Jawa*, *khatip*, *tústús*, *sússú*, Sutlej; *Gwia*, *guya*, Kumaun.

A large deciduous shrub, with greyish brown bark,  $\frac{1}{8}$  inch thick. Wood white, hard to very hard, close-grained. Pores very small, uniformly distributed. Medullary rays fine and very fine, extremely numerous. On a horizontal section are seen linear, concentric, but short and interrupted patches of soft tissue, which shew on a vertical section as undulating lines of darker colour and of varying length.

Suliman Range, North-West Himalaya, between 4,000 and 11,000 feet.  
The ripe fruit is eaten.

H 52. } Nagkanda, Simla, 8,000 feet.  
H 2869. }  
H 76. Mashobra, „ 7,000 „

2. *V. Mullaha*, Ham.; Brandis 258, 576. *V. stellulatum*, Wall. Vern. *Jal bágu*, Jhelum; *Ambiacha*, *phulseh*, Kashmir; *Lal titmaliya*, Kumaun; *Eri*, *ira*, Simla.

A shrub. Bark dark grey, reticulate. Wood white, moderately hard; structure the same as that of *V. cotinifolium*.

North-West Himalaya from 6,000 to 10,000 feet. Fruit eaten.

H 2834. The Glen, Simla, 6,000 feet.  
H 2866. Nagkanda, „ 8,000 „

3. *V. coriaceum*, Bl.; Brandis 259; Gamble 46. Vern. *Kala titmaliya*, Kumaun; *Bara gorakuri*, Nep.

A large shrub or small tree Bark grey brown, rather corky Wood similar to that of *V. cotinifolium*, but the pores larger and the medullary rays slightly broader

Himalaya from the Sutlej to Bhutan at 1000 to 8000 feet Khasia Hills Nilgiris and Ceylon

Weight 60 lbs per cubic foot The Nepalese are said to extract from the seeds an oil which they use for food and for burning

H 2835. The Glen Simla 6000 feet

lbs  
60

4 *V. erubescens*, Wall, Beddome exxiv, Brandis 258, Gamble 46 Vern *Gauné*, Nep, *Kancha*, Lepehr, *Damshing*, Bhutia

A small tree, with thin grey bark Wood very hard, reddish, close and even-grained Pores very small Medullary rays undulating, fine and very fine, very numerous No medullary patches

Himalaya from Kumaun to Bhutan between 5000 and 11000 feet Nilgiris and Ceylon

Weight 69 lbs per cubic foot The wood might do as a substitute for boxwood and for carving Used for house posts in Sikkim It grows well and quickly from cuttings

F 2381 Rangbul Darjeeling 7000 feet

lbs  
69

5 *V. lutescens*, Bl, Kurz ii 2 Gamble 46

A large shrub Bark greyish brown, thin Wood reddish, soft Pores moderate sized, very numerous Medullary rays fine very numerous Annual rings not visible

Tera and Lower Hills of Sikkim Assam Khasia Hills in damp evergreen forests

E 3273 Muraghat Reserve W Duars

6 *V. foetens*, Decaisne, Brandis 259. Vern *Guch klu*, *kunch*, *Jhelum*, *Kilmich*, *guch*, *keistim*, *kulira*, *jamara*, Kashmir, *Tilha*, *pulru*, *tilats*, *tuin*, Chenab, *Talkang*, *tanlei*, *tuilhe*, *tuins zents*, Ravi, *stey*, *Giya*, Kumaun

A 1 white, hard to very hard close gr and structure to that of

*V. cotinifolium*

North West Himalaya from 5000 to 11000 feet

Weight 63 lbs per cubic foot Fruit eat u

H 53 Narkanda Simla 8000 feet

lbs  
63

H 2586

H 3015 Matigani

E 975 Chuimbi Valley Tibet 10000 feet

### 3 ABELIA, Brown.

1 *A. triflora*, R Brown, Brandis 257 Vern *Idet*, *pik'awar* Trus Indus, *Cheta bita*, Jhelum, *Jian lakharn*, *salinker*, Chenab, *D lva*, *Atsai*, Ravi, *Ellang*, *rat lang*, *peni*, Sutlej, *Unari*, *gorits*, *Arats*, Kumaun



A large shrub. Bark grey, with longitudinal fissures. Wood greyish or bluish white, hard, close and even-grained. Pores extremely small, except those at the edge of each annual ring, which are small and continuous. Medullary rays very numerous, moderately broad and very fine, the former short.

Safedkoh and Suliman Range, North-West Himalaya, between 4,000 and 10,000 feet.

Has very pretty flowers, but the wood is not used. Weight, 65 lbs. per cubic foot.

H 2937. Naldehra, Simla, 7,500 feet . . . . . lbs.  
65

#### 4. LONICERA, Linn.

Contains 26 species, 21 of which are erect and 5 climbing. They are mostly small shrubs of the Himalaya, 2 only being found in the Nilgiris and Western Ghâts. The Himalayan species are mostly from high altitudes, some occurring only in Tibet. *L. spinosa*, Jacquemont; Brandis 255, is a small rigid shrub of the inner arid Himalaya. *L. hypoleuca*, Decaisne, Brandis 256. Vern. *Kharro, tadi*, Chenab; *Zhiko, rapesho*, Sutlej, is a small shrub of the Inner Himalaya. *L. Myrtillus*, Hook. f. and Th., is a shrub of the Inner Himalaya from the Indus to Sikkim, from 9,000 to 12,000 feet. *L. ligustrina*, Wall.; Beddome exxiv., is a shrub, common on the Nilgiris, where it is used as a hedge-plant: it is also found in the Himalaya. Of the climbing species, *L. japonica*, Thunb.; Gamble 46. Vern. *Duari tara*, Nep.; and *L. glabrata*, Wall.; Gamble 45. Vern. *Bellara*, Nep. (No. E 2863. Tukdah, Darjeeling, with a soft brown wood, large pores and the structure of a climber) come from the Eastern Himalaya; while *L. Leschenaultii*, Wall., grows in the Malabar hills from 5,000 to 7,000 feet. The European Honeysuckle is *L. Periclymenum*, Linn.

1. *L. quinquelocularis*, Hardwicke; Roxb. Fl. Ind. i. 537; Brandis 255. Vern. *Jarlangei, adei*, Trans-Indus; *Phút*, Jhelam; *Tita bateri, pdkhur*, Kashmir; *Bakhrn*, Chenab; *Khém, sái*, Ravi; *Dendra*, Beas; *Kliunti, kraunti, takla, zhang, razbam, bhajra, bhijaul, bijgai*, Sutlej; *Bet kukri, bhat kukra, cheraya, kumali*, Kumaun.

A large deciduous shrub. Bark thin, grey, with longitudinal fissures, peeling off in long shreds. Wood white, with a brown centre, very hard and close-grained. Annual rings marked by a narrow continuous belt of pores; in the remainder of the annual ring the pores are extremely small. Medullary rays short, fine, numerous.

Suliman Range, North-West Himalaya, between 2,500 and 9,000 feet.

Used only for firewood. Cattle are fed on the leaves. Weight, 52 lbs. per cubic foot.

H 81.	Mashobra, Simla, 7,000 feet	. . . . .	lbs.
H 2874.	Nagkanda, „ 8,000 feet	. . . . .	52
H 3180.	Dungagalli, Hazara, 7,000 feet	. . . . .	...

2. *L. orientalis*, Lamarck; Brandis 256.

A shrub. Bark peeling off in thin flakes. Wood white, with a darker centre, moderately hard. Structure the same as that of *L. quinquelocularis*.

North-West Himalaya, from Kashmir to Kumaun, 8,000 to 10,000 feet.

H 2909. Nagkanda, Simla, 8,000 feet.  
H 3017. Hattu, Simla, 10,000 feet.

3 *L. angustifolia*, Wall, Brandis 255 Vern *Geang*, Jaunsar, *Pitrn, phiku* Sutlej

A small shrub, with smooth, grey bark, exfoliating in broad flakes Wood white, very close grained Structure similar to that of *L. quinquelocularis*, but pores much smaller

Himalaya from the Indus to Sikkim 6000 to 10000 feet Fruits eaten Weight 60 lbs per cubic foot

H 2813 Mahasu Simla 8500 feet

H 2875 Nagkanda Simla 8000 feet

1-2  
60

4 *L. alpigena*, Linn, Brandis 256

A shrub Bark grey brown, peeling off in irregular papery flakes Wood moderately hard, structure similar to that of *L. quinquelocularis*

North West Himalaya from Kashmir to Kumaun 8000 to 10000 feet

H 2912 Nagkanda Simla 8000 feet

H 3016 Hattu Simla 10000 feet

## 5 LLYCFSTERIA, Wall

1 *L. formosa*, Wall, Brandis 256 Gamble 16 Vern *Malkarr, saunyla, nalkaru, karnaliya*, Kumaun *Tungul*, Lepcha

An erect shrub with hollow, generally herbaceous stems Bark grey, shining Wood resembling in structure that of *Lonicera*, but with slightly broader medullary rays

Through out the Himalaya from the Sutlej to Bhutan from 5000 to 10000 feet

H 2810 Mahasu Simla 8000 feet

## 6 PENTAPIXIS, Hook f

Contains 2 species *P. glaucophylla* Hook f is a shrub of the Sikkim Himalaya from 5000 to 9000 feet

1 *P. stipulata*, Hook f, Gamble 45 *Lonicera stipulata*, Hook f and Th in Journ Linn Soc ii 165 Vern *Beriluru* Nep

A large shrub, with greyish brown bark Wood white, soft Pores extremely small Medullary rays fine and very fine No annual rings

Sikkim Himalaya, from 6000 to 10000 feet very common on hill sides cleared of forest around Darjeeling

F 2866 Pangbul Darjeeling 7000 feet

## ORDER LVI RUBIACEÆ

A large and very important forest Order containing many trees which are valuable for their timber besides plants which have valuable properties chiefly as tannin cures and dyes. It contains 41 Genera divided into 13 Tribes viz —

Tribe I — a cleer

*Sarcocaulis Anthorhiza*  
*Cephalanthus Adansia*  
*glaucyne Novales* and  
*Cactina*

Tribe	II.—Cinchonere	Cinchona, Hymenopogon, Hy-
		menodictyon and Luculia.
"	III.—Rondeletiere	Wendlandia.
"	IV.—Hedyotide	Hedyotis.
"	V.—Mussaendere	Mussaenda, Adenosacme, Myrio-
		neuron and Urophyllum.
"	VI.—Gardeniere	Byrsophyllum, Webera, Ran-
		dia, Gardenia, Hypobath-
		rum, Petunga, Morin-
		dopsis, Hyptianthera and
		Diplospora.
"	VII.—Retiniphyllere	Scyphiphora.
"	VIII.—Guettardere	Guettarda and Timonius.
"	IX.—Vangueriere	Plectronia and Vangueria.
"	X.—Ixoree	Ixora, Paretta and Coffea.
"	XI.—Morindere	Morinda and Gynochthodes.
"	XII.—Psychotriere	Psychotria, Chasalia, Lasi-
		anthus, Saprosmia and
		Hydnophytum.
"	XIII.—Prederiere	Paderia, Hamiltonia and
		Leptodermis.

*Sarcocephalus cordatus*, Miq.; Beddome t. 318; Kurz ii. 63 (*Nauclea cordata*, Roxb. Fl. Ind. i. 508). Vern. *Maoolet-tan-shay*, Burm.; *Bakmi*, Cingh., is a deciduous tree of Burma and Ceylon, with a light, soft, perishable wood, weighing 23 to 33 lbs. per cubic foot. Beddome says it is used for sandals, common furniture, doors and other purposes. *Cephalanthus naucleoides*, DC.; Kurz ii. 68, is a small tree of Upper Burma. *Uncaria* contains several scandent shrubs, *U. pilosa*, Roxb. Fl. Ind. i. 520; Kurz ii. 70; Gamble 47. Vern. *Baisi kara*, Nep.; *Kahukrik*, Lepcha, is a straggling shrub of Sikkim, Eastern Bengal and Burma, with large hooked sterile peduncles of the shape of a buffalo's horn, and handsome globular flower heads. *U. sessilifructus*, Roxb. Fl. Ind. i. 520; Kurz ii. 71; Gamble 47. Vern. *Pinri*, Lepcha, is a climber of Sikkim, Eastern Bengal, Chittagong and Burma. Kurz gives also *U. ferruginea*, DC., *U. sessilifolia*, Roxb., and *U. lavigata*, Wall., as climbing shrubs of Burma; while *U. Gambier*, Hunter; Roxb. Fl. Ind. i. 517; Beddome cxxix., is a scandent shrub of Ceylon and the Malay Archipelago, whose leaves produce the astringent extract called "Gambier," or "Terra japonica," which is used for chewing with pán leaves and areca nut in the same way as cutch in India, and of which large quantities are prepared and used throughout the Malay Archipelago.

*Hymenopogon parasiticus*, Wall.; Kurz ii. 73; Gamble 47. Vern. *Kursimla*, Nep., is an epiphytic shrub of the North-East Himalaya and Burma. *Luculia gratissima*, Sweet. Kurz ii. 71; Gamble 47. Vern. *Dowari*, Nep.; *Simbrangrip*, Lepcha, is a large shrub with handsome long-tubed pink flowers, found in the hills of Sikkim and in Upper Burma. Its leaves are used in dyeing. Weight 23 lbs. (Wallich, No. 43).

*Hedyotis* contains only small climbing shrubs. They are very numerous, and many of the species are used in dyeing.

*Mussaenda* contains about 7 large shrubs remarkable for having one of the lobes of the calyx enlarged into a membranous, usually white leaf. *M. frondosa*, Linn.; Roxb. Fl. Ind. i. 557; Beddome cxxi.; Gamble 48. Vern. *Asari*, Nep.; *Tumberh*, Lepcha; *Maasenda*, Cingh., is a handsome shrub of the North-East Himalaya, Bengal, South India and Burma, with yellow flowers and large white calycine leaf, often cultivated in gardens. *M. macrophylla*, Wall.; Kurz ii. 57; Gamble 48, is a small tree of second-growth forest in the Sikkim Himalaya; also found in the Andamans. Kurz mentions 5 other species as occurring in Burma. *Adenosacme*, W. & A. Kurz ii. 54; Gamble 48. Vern. *Pitamari*, Nep., is a shrub of the North-East Himalaya and Burma, remarkable for its pretty snow-white berries. *Myrsophyllum*, R. Br.; Kurz ii. 55, is a shrub of Chittagong. *Urophyllum* contains 3 shrubs or small trees of Martaban and Tenasserim and 2 small trees of Ceylon.

*Byrsophyllum tetrandrum*, Beddome t. 326, is a small tree of the hills of Travancore. *Hypobathrum racemosum*, Kurz ii. 51 (*Randia racemosa*, Roxb. Fl. Ind. i. 525) Vern. *Peetunga*, Beng., is a shrub of Eastern Bengal and of the swamp forests of Pegu and Arracan. *Petunga Roxburghii*, DC. Vern. *Jhijir*, Beng., is a small tree of

the Sundarbans with hard white wood, and *Morindopsis capillaris*, Kurz, a tree of Pegu, Martaban and Tenasserim. *Hyptianthera stricta*, W. and A.; Brandis 274 (*Hypobathrum strictum*, Kurz ii 50, *Randia stricta*, Roxb Fl Ind i 626), is an evergreen shrub of Oudh, Northern Bengal, Chittagong and Burma. *Diplospora singularis*, Korth; Kurz ii 56 (No B 1993, Andamans Vern. *Thilloo*, with white wood, 36 lbs), is a tree of

4, is a small

1987, Andamans, 48 lbs), is

*Foa ranga*,  
Kyd calls it  
1 626, Kurz

ii 31; Gamble 19 Vern *Iluy ma lyee*, Burm., is a thorny small tree of Bengal and Burma; and *V. pubescens*, Kurz ii 31, a tree of the Eng and dry forests of Burma.

*Gynochthodes macrophylla*, Kurz, is a scandent shrub of the coasts of South Andaman

*Psychotria* and *Lasiacanthus* contain a large number of small evergreen shrubs of Bengal, Burma and South India. *Chasalia curvistylis*, Thw., Kurz ii, 14, Gamble 19 Vern. *Antabi*, Lepcha, is a small shrub of the hills of Northern Bengal, Burma and Ceylon. *Saprosma* contains 1 shrub of South India and 2 of Burma. *Hydnophytum formicarum*, Jack, Kurz ii 8, is a small epiphytic shrub with an enlarged tuber-like trunk found on trees in the swamp forests of the Andamans

*Paderia* contains several shrubs or climbers: *P. lanuginosa*, Wall., Kurz ii. 76, is a large climber of the forests of Burma, and *P. fatida*, Wild., Roxb Fl Ind i. 683; Gamble 19 Vern. *Gundha badhuli*, Beng., *Gunduli*, Hind., *Paderia*, Nep.; *Talpaderia*, Lepcha, is a thin climber of Bengal and Burma, with handsome flowers, and fruit which is said to be used in Sikkim by Nepales and Lepchas to blacken the teeth, and prevent toothache. *Hamiltonia suarcolens*, Roxb Fl Ind i 651, Beddome cxxxiv 12, Brandis 278, Gamble 19 Vern *Muskeri*, *Kantulu*, *Sisanni*, Cherab, *Nigqi*, *tulenni phul*, *gohinta*, Ravi, *Kanera*, *pudari*, Bas, *Philla*, Suthi, *Padera*, Kumaun, *Bainchampa*, Nep., is a shrub of the North-West Himalaya, Sikkim (rare), B. har, Central and South India, with handsome lilac flowers, the wood is said by Brandis to be used in Chamba to make gunpowder charcoal

Besides the genera described from India, which include such important ones as *Cinchona*, *Coffea* and *Morinda*, many genera contain plants of economic use. *Cephaelis* is a way as to the *Blangul*, other genera are commonest *Ixoras* and

Wood white, yellow, or rarely red, close-grained, generally soft or moderately hard; no heartwood. Pores small or very small; in *Anthocephalus* *Cadamba* and a few other species, moderate-sized. Medullary rays uniform, equidistant, fine or very fine, very numerous, often closely packed.

The species which were formerly united under the old genus *Nancea*, genera Nos. 1 to 4, have an exceedingly uniform structure. The wood seasons well, is soft, but close and even-grained. Pores numerous, small to moderate-sized. Medullary rays fine, very numerous

## 1. ANTHOCEPHALUS, A. Richard.

1. *A. Cadamba*, Bth. and Hook f.; Brandis 261, Gamble 16, *Nancea latifolia*, Roxb Fl. Ind i. 512, Beddome t. 35. *Sarcocaulis*

*Calamba*, Kurz ii. 63. Vern. *Kaddam*, *karam*, Hind., Beng.; *Bol-kadam*, Chittagong; *Pandúr*, Lepcha; *Kodum*, Mechi; *Roghū*, Ass.; *Kadambo*, Uriya; *Tella cadamba*, Tam.; *Kadambe*, *rudrak-shamba*, Tel.; *Heltega*, *arsanatega*, Mysore; *Kadam*, Mar.; *Kadda wailu*, *kadaga*, *kadiwal*, Kan.; *Haloriba*, Cingh.; *Maoo*, *sanyepang*, Magh; *Maoo*, *maookadoon*, Burm.

A large deciduous tree. Bark grey, with numerous regular, longitudinal fissures. Wood white, with a yellowish tinge (an old specimen from Burma, yellowish grey), soft, even-grained. Pores large, oval, elongated, subdivided, sometimes in short radial lines. Medullary rays fine, numerous, close together, bent outwards where they touch the pores.

Wild in Northern and Eastern Bengal, Pegu and the Western Coast; cultivated in Northern India.

Growth variable, 5 to 15 rings per inch of radius, average moderate, 9 rings per inch. The weight and transverse strength have been determined by the following experiments:—

Experiment by whom made	Year	Wood whence procured	Weight.	Number of experiments.	Size of scantling.	Value of P.
			lbs		Pl. In. In.	
Pearle, No 19	1859	Mysore	63	2	2 × 1 × 1	618
Kyū	1851	Assam	50		2 × 1 × 1	560
Cunningham	1854	Awahar	47	5	2 × 1 × 1	618
Brandis, No 67	1862	Burma	37		...	.....
Wallich		Travancore	34		...	.....
Emythes	1874	Bengal	49	2	...	.....
"	"	Assam	32	1		.....

Wood used for building, in Assam, Cachar and occasionally in Darjeeling for tea-boxes. Cunningham (1854) says that it is used for beams and rafters on account of its cheapness and lightness, and that it is good for joiner's work, but that it is a brittle wood. The flowers are offered at Hindu shrines and the fruit eaten. It is often cultivated for ornament, and is very much used as an avenue tree in Bengal. Kurz, evidently quoting Brandis' 1862 List, No. 67, says "wood, a deep yellow;" this is not, however, the case with our specimens, and it may be suggested for investigation whether the Burma wood has not a more yellow colour than the Indian.

			lbs.
E 650	Rakti Forest, Darjeeling Terai		40
E 3153	Pankabari, Darjeeling (damp)		50
E 3144	Julpigori, Bengal		40
E 1435.	Assam		32
B 2635	Burma (1862)		32

## 2. ADINA, Salisbury.

Contains 3 Indian species. *A polycephala*, Hook. f. and Bth. (*Nauclea polycephala*, Wall., Kurz ii. 65), is a small evergreen tree of Chittagong and Tenasserim.

1. *A. cordifolia*, Hook. f. and Bth.; Brandis 263; Gamble 46. *Nauclea cordifolia*, Roxb. Fl. Ind. i. 514; Beddome t. 33; Kurz ii. 66. Vern. *Haldu*, *hardu*, *karam*, Hind.; *Bangka*, *keli-kadam*, *petpuria*, *da-kôm*, Beng.; *Karam*, Nep.; *Tikkoe*, Bahraich and Gonda; *Hardu*, *paspū*, *kurmi*, Gondi; *Holonda*, Uriya; *Shangdong*, Gáro; *Roghū*, Ass.; *Manja-kadambe*, Tam.; *Bandaru*, *dúdagū*, *paspū kadambe*, Tel.; *Hedde*, *yettéga*, *pettega*, *arsanatéga*, *yettada*, *ahnau*, Kan.; *Hedu*, Mar.; *Kolong*, Cingh.; *Thaing*, Magh; *Hnanbeng*, Burm.

A large deciduous tree. Bark soft,  $\frac{1}{2}$  inch thick, grey, rough. Wood yellow, moderately hard, even-grained. No heartwood, no annual rings.

Pores small, numerous, uniformly distributed, more numerous and more closely packed than in *Stephegyne parvifolia*. Medullary rays very fine, of uniform width not prominent, numerous, distinctly visible on a radial section, finer and more uniform in width than those of *S. parvifolia*.

Sub-Himalayan tract from the Jumna eastwards, ascending to 3000 feet, throughout the moister regions of India Burma

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Year	Wood whence procured.	Weight	Number of experiments	Size of bar	Value of 1
			lbs		Ft In In	
Puckle No 26	1850	Mysore	36	4	2 x 1 x 1	464
Skinner No 90	1851	South India	42			604
Cumt Ingham	1854	Gwalior	49	"	2 x 1 x 1	56
Brands	1864	Burma	43	7	3 x 1 x 1	700
Brands No 65	1866		47			
R Thompson	1869	Central Provinces	47			
O P list	1873		42			
Smaythies	1888	D Berent Provinces	40	11		

The wood seasons well takes a good polish and is durable, but somewhat liable to warp and crack. It is good for turning and is extensively employed in construction, for furniture agricultural implements, opium boxes writing tablets, gun stocks, combs and occasionally for dug out canoes

O 216	Garhwal (1863)	lbs
O 2994	(1874)	43
O 1491	Kheri Oudh	46
O 310	Gorakhpur	49
C 825	Buragah Reserve, Berar	41
C 2988	Jubbulpore (1863)	18
C 1136	Ahri Reserve, Central Provinces	43
C 1245	Gumsur Madras	44
E 2387	Bamunpokri Darjeeling Terai	49
B 2538	Burma (1862)	60
No 35	Salem Collection	43
		40

2. *A. sessilifolia*, Hook. f. and Bth, Brandis 264 *Nuclea sessilifolia*, Roxb. Fl Ind i. 515, Kurz ii 65 *Nuclea sericea*, Wall. Vern. Kum, Beng, Kumloi, Chakma, Thaing, Magh, Teingala, thispayoung, Burm

Wood yellowish brown, hard Pores very numerous, moderate-sized, oval and subdivided, transverse diameter greater than the interval between the closely packed, fine, and uniform medullary rays

1862 No 70 43 to 56 lbs., our wood is used in Chittagong for perhaps the only gregarious tree, rivers

F 1391	Chittagong	lbs.
B 2537	Burma (1862)	53
B 3069	" "	56
		59

## 3. STEPHEGYNE, Korth.

Contains about 4 species of Indian trees. *S. diversifolia*, Hook. f. and B. (*Nauclea diversifolia*, Wall., placed by Kurz under *N. parvifolia*). Vern. *Binga* Burm., is a tree of Burma (weight, 45 lbs., Brandis' Burma List, 1862, No. 66), and *S. tubulosa*, Hook. f. and Bth.; Beddome cxxviii., is a tree of Ceylon.

1. *S. parvifolia*, Hook. f. and Bth.; Brandis 262. *Nauclea parvifolia*, Roxb. Fl. Ind. i. 513; Beddome t. 34; Kurz ii. 66. Vern. *Kaddam*, *kallam*, *keim*, *kangei*, Hind.; *Phaldu*, Kumaun; *Mundi*, Gondi, Baigas; *Kutebi*, Kurku; *Buta-kadambe*, Tam.; *Nir-kadambe*, *karmi*, *bata-ganapu*, Tel.; *Congú*, *hedu*, *yetega*, *kadwar*, *kadani*, Kan.; *Kadamb*, *karamb*, *kalam*, Mar.; *Tamá*, *Bhíl*; *Helembé*, Singh.; *Kumra*, *Banswara*, *Hteinthay*, Burm.

A large deciduous tree. Bark  $\frac{1}{2}$  inch thick, light grey, smooth, with shallow depressions left by exfoliating scales. Wood light pinkish-brown, moderately hard, generally harder than that of *Adina cordifolia*. No heartwood. Annual rings visible. Pores small, numerous, uniformly distributed. Medullary rays very fine, numerous, not quite uniform in width.

Throughout India and Burma.

Growth moderate, 5 to 15, averaging 9 rings per inch of radius. The weight and transverse strength have been determined by the following experiments:—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar.	Value of P.
			lbs.		Ft. In. In.	
Cunningham	1854	Gwalior	35	2	2 x 1 x 1	586
Skinner, No. 100	1863	South India	39	..	.. ..	693
Brandis, No. 69	1862	Burma	43	..	.. ..	..
R. Thompson	1803	Central Provinces	47	..	.. ..	..
Mythes	1879	As below	42.7	11	.. ..	..
Mendis, No. 35	1855	Ceylon	42	..	.. ..	..

The wood is easily worked and polishes well; it is durable, if not exposed to wet. It is used for building, furniture, agricultural implements, combs, cups, spoons and other articles, and for turned and carved articles.

P 458.	Ajmere	lb.
O 269.	Garhwal (1868)	..
O 529.	Dehra Dún	..
O 344.	Gorakhpur	..
O 1481.	Kheri, Oudh	..
O 178.	Mandla, Central Provinces (1870)	..
O 186.	" " " "	..
1120.	Ahri Reserve, Central Provinces	..
2783.	Melghát, Berar	..
561.	Prome	..
2539.	Burma (1862)	..
36.	Salem Collection	..
35.	Ceylon Collection	..
		40
		38
		41
		42

W 1225 (42 lbs , growth moderate, 8 rings per inch of radius) received from  
 It is probably *Nauclea*  
*thana*, Kan

2. *S. Sp* Gamble 46 Vern *Kalé, kalikat*, Nep

A large tree Bark brownish white Heartwood orange yellow,  
 sapwood reddish Wood moderately hard Pores large and moderate-  
 sized, very numerous, filled with a gummy substance Medullary rays  
 fine, very numerous, undulating.

Weight, 41 lbs per cubic foot Used for building.

E 2385 Chenga Forest, Darjeeling

lbs  
 11

4 NAUCLEA, Linn

Contains 3 or 4 Indian trees *N elliptica* Dalz, a large tree of the Western  
 Coast has been referred to above *N purpurea* Roxb, B. ddome cxxix, is a tree of  
 the Eastern Ghats of South India. Kurz gives *N excelsa*, Bl., as a large evergreen  
 tree of Pegu

1. *N. rotundifolia*, Roxb Fl Ind : 516, Kurz II 67 Vern *Bingah*,  
 Burm

Wood yellowish brown, moderately hard, close and even-grained  
 Pores small and moderate-sized Medullary rays fine, uniform, very  
 closely packed, the transverse diameter of the pores being greater than  
 the interval between two successive rays

Burma and the Andaman Islands

Weight, 47 lbs per cubic foot Wood not used, but likely to be of value

B 2536 Burma (1862)  
 B 2288 Andamans (1866)

lbs,  
 51  
 11

B 2237 (47 lbs) sent from the Andamans in 1866 under the name *Mitsinbyoo*  
 resembles in structure *N rotundifolia*, except that it has slightly larger pores

5 CINCHONA, Linn.

A genus of about 30 species of trees or shrubs found in a narrow belt along the  
 Andes of South America, between 2000 and 8000 feet elevation. Several species give

1. *C. succirubra*, Pavon, Branlis 265; Gamble 47. Red Bark.

Wood yellow, moderately hard Pores small, in radial lines.  
 Medullary rays closely packed, fine and very fine.



Cultivated on the Nilgiris and other hills of South India, at the plantations of Rangbi and Poomong in Sikkim, on the hills east of Toungoo in Burma and in part of the Satpura Range in Central India. This species thrives at a lower elevation than the others, but is comparatively poor in quinine, though rich in cinchonine and cinchonidine. From this species is chiefly derived the "Cinchona Alkaloid," which is now largely manufactured at the Government Plantation of Rangbi.

E 1357. } Rangbi, Darjeeling, 3,700 feet.  
E 3157. }

## 2. *C. Calisaya*, Weddell; Brandis 266; Gamble 47. Yellow Bark.

Wood reddish-grey, moderately hard, even-grained. Pores small in short radial lines. Medullary rays fine, closely packed.

Cultivated in Sikkim at moderate elevations.

It yields perhaps the most valuable of the Cinchona barks, rich in alkaloids, among which quinine forms  $\frac{1}{3}$  to  $\frac{4}{5}$ ths.

E 1358. } Rangbi, Darjeeling, 3,700 feet.  
E 3158. }

## 3. *C. officinalis*, Linn.; Brandis 266; Gamble 47. Loxa or Crown Bark.

Wood yellowish grey, similar in structure to that of *C. Calisaya*.

Cultivated at high elevations on the Nilgiris, in Ceylon and in Sikkim, but not extensively.

Its bark is rich in alkaloids, of which more than one-half is quinine.

E 1356. } Rangbi, Darjeeling, 3,700 feet.  
E 3159. }

## 6. HYMENODICTYON, Wall.

Contains about 4 species. *H. flaccidum*, Wall.; Brandis 268; Gamble 47, is a tree of the hills of Eastern Bengal and the outer Himalaya as far west as the Jumna. *H. obovatum*, Wall.; Beddome t. 219; Brandis 268. Vern. *Yella malla kai*, Tam.; *Mallay tandk*, Madura; *Karwai*, Bombay, is a large tree of the Western Ghâts.

1. *H. excelsum*, Wall.; Beddome cxxx.; Brandis 267. *Cinchona excelsa*, Roxb. Fl. Ind. i. 529. Vern. *Bartu*, *barthoa*, Pb.; *Bhaulan*, *bhalena*, *bhamina*, *dhauli*, *kukurkat*, *bhurkur*, *phaldu*, *bhohar*, *potur*, Hind.; *Dondru*, *dandelo*, Panch Mehals; *Bhoursal*, Mar.; *Sagapu*, Tam.; *Dudiyetta*, *dudippa*, *chetippa*, *burja*, *bandara*, Tel.; *Bodoka*, Uriya; *Manabina*, Karnul.

A large deciduous tree. Bark soft,  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick, grey, exfoliating in irregularly shaped, softish scales. Wood brownish grey, soft. Annual rings indistinctly marked. Pores moderate-sized, uniformly distributed, often in short radial lines. Medullary rays fine, very numerous, visible on a radial section. Numerous faint, white, transverse bars joining the medullary rays.

Sub-Himalayan tract from the Punjab to Oudh, ascending to 5,500 feet; Central and South India.

Growth moderate, 6 to 7 rings per inch of radius. Average weight of our specimens 31.5 lbs. per cubic foot. Wood used for agricultural implements, scabbards, grain measures, palanquins, toys and similar articles. The inner bark is bitter and

astringent and is used as a febrifuge and for tanning the leaves are used as cattle fodder

O 216	Garhwal (1868)	lbs
O 300	Gorakhpur (1868)	23
O 1462	Bharatpur Oudh	32
O 1482	Kleri Oudh	34
C 1127	Alm Reserve Central Provinces	32

2 *H. thyrsoiflorum*, Wall, Kurz n 72, Gamble 17 *Cinchona thyrsoiflora*, Roxb Fl Ind 1 530 Vern *Purgur*, Hind, *Ahoon*, Burm

A deciduous tree Bark 1 inch thick, grey, with corky flakes Wood white or grey, soft Annual rings indistinctly marked Structure the same as that of *H. excelsum*

Northern and Eastern Bengal and Burma

Growth moderate 10 rings per inch of radius Weight according to Brandis Burma I st of 1862 No 101 23 lbs our specimens give an average of 33 lbs Used for black boards and packing-cases

F 1231	Sibsagar Assam	lbs
E 1286	Cachar	26
B 279	Burma (1867)	34
B 3070	(1862)	31
B 569	Prome Burma	33
B 2287	Andaman Islands	34

## 7 WENDLANDIA, Burthng

Contains about 12 Indian species *W. tinctoria* DC Beddome exx Brandis 269 Kurz n 71 (*Rondeletia tinctoria* Roxb Fl Ind 1 12) *Wendlandia* n (Gamble 49) Vern *Tula lodh* Bengal *Kang*, Nep *Singol* Lepcha *Tella* Uriya *Timayole* Burm is a small tree of the forests of Kumaun Oudh Bihar Bengal and Burma whose bark is used in Bengal as a mordant in dyeing Several other species are found in the North East Himalaya and several in Burma chiefly Tenasserim but they are unimportant One or two are climbers

1 *W. exserta*, DC, Beddome exx, Brandis 268, Gamble 49 *W. cinerea*, DC, Gamble 17 *Rondeletia exserta*, Roxb Fl Ind 1 523 Vern *Chaulai*, *chila*, *chilkiya*, *tila*, *birsa*, *tilli*, *tulu*, Hind, *Kang*, *tilli*, *numri*, Nep, *Kursi*, Seoni, *Marria*, Gondi, *Tilliah*, Baigas in Mandla

A small deciduous tree with brown bark Wood reddish brown, hard, close grained Pores small, medullary rays moderately broad and fine, the former short Annual rings marked by firmer wood on the outer and more porous wood on the inner edge of each ring

Sub-Himalayan tract from the Ceraib eastwards Oudh Bengal Central and South India

Growth fast 45 rings per inch of radius Weight 47 lbs Wood used for building and agricultural implements and used for house posts in the Sikkim Terai

O 1700	G. B. O. B.	lbs
E 1081	Khokhlo Forest Darjeeling Terai	47

2 *W. Notoniana*, Wall, Beddome t 224, Fluvates Baum 159 Vern *harneetelle*, Singh

A small tree of South India and Ceylon, with a red wood, having a similar structure to that of *W. exserta*.

No. 74. Ceylon Collection (marked *W. bicuspidata*) . . . . . lbs.  
48

### 8. WEBERA, Schreb.

Contains about 10 species of small trees, shrubs or climbers from Eastern Bengal, South India and Burma.

*W. oppositifolia*, Roxb. Fl. Ind. i. 698; Kurz ii. 47 is a small tree of Chittagong and Burma, said by Kurz to have a yellowish white, heavy, close-grained wood. *W. glomeriflora*, Kurz ii. 47, is a small tree of the Pegu Yomas. *W. myrtifolia*, Kurz ii. 49, is a small tree of the swamp forests of Burma and *W. monosperma*, W. and A.; Beddome cxxxiv., is a shrub of the Nilgiri Hills and Wynnad. Kurz also describes 4 scandent shrubs from Chittagong and Burma. Roxburgh gives *W. scandens*, Roxb. Fl. Ind. i. 698. Vern. *Gajer kota*, Beng., as a climber; and *W. odorata*, Roxb. Fl. Ind. i. 699. Vern. *Patagrúja*, Beng., as a small tree, of the forests of Sylhet.

1. *W. asiatica*, Linn.; Beddome cxxxiii. *W. corymbosa*, Willd.; Roxb. Fl. Ind. i. 697. *Stylocoryne Webera*, A. Rich.; Thwaites Enum. 158. Vern. *Kankra*, Beng.; *Kachuria chál*, Cuttack; *Komi*, Tel.; *Tarana*, Cingh.

A large shrub or small tree. Wood yellowish white, hard, close-grained. Pores small, very numerous, uniformly distributed. Medullary rays short, fine and extremely fine.

Bengal, South India and Ceylon.

Weight, 57 lbs. per cubic foot. The wood is said by A. Mendis to be used in Ceylon for fishing-boats.

No. 84. Ceylon Collection . . . . . lbs.  
57

### 9. RANDIA, Linn.

Contains 10 to 12 species of shrubs or small trees, generally armed with strong axillary thorns. *R. rigida*, DC.; Brandis 273; Gamble 48, is a shrub found in the forests of the Eastern Himalaya, Nepal and probably Kumaun. *R. fragrans*, Beddome cxxxii. (*Posoqueria fragrans*, Kön.; Roxb. Fl. Ind. i. 717). Vern. *Pedalli*, Tel., is a shrub of South India, used to make hedges. *R. Gardneri*, Thw.; Beddome cxxxii., is a small tree of the South Tinnevely hills and Ceylon; *R. dekkansensis*, Beddome cxxxiii., is a small tree of the Anamalais; and *R. speciosa*, Beddome cxxxii., a climbing shrub of the Western Gháts, with sweet-scented flowers. *R. nutans*, DC.; Kurz ii., 45 is a shrub of the forests of Pegu.

Wood smooth, close-grained, hard. Pores small or very small. Medullary rays fine and very fine.

1. *R. uliginosa*, DC.; Beddome cxxxii.; Brandis 273; Kurz ii. 44; Gamble 48. *Posoqueria uliginosa*, Roxb. Fl. Ind. i. 712. Vern. *Pindálu*, *pindar*, *panár*, *paniah*, *bharani*, *katúl*, Hind.; *Piralo*, Beng.; *Maidal*, Nep.; *Kaurio*, Panch Mehals; *Pendra*, Uriya; *Katíl*, *pender*, *Gondi*; *Gangru*, *gangáru*, Kurku; *Nallaika*, *nalla kakisha*, Tel.; *Wagatta*, Tam.; *Karé*, *pendri*, Kan.; *Telphetru*, *panelra*, *phetra*, *pindra*, Mar.; *Tapkél*, Bhíl; *Mhaniben*, *mhanpyoo*, Burm.

A small deciduous tree. Bark  $\frac{1}{2}$  inch thick, reddish brown, exfoliating in thin flakes. Wood whitish grey, close-grained, hard, no heart-wood. Annual rings marked by a narrow belt without pores. Pores

small and very small, numerous, uniformly distributed Medullary rays fine and very fine, very numerous, distinctly visible on a radial section

Sub Himalayan tract from the Jumna eastwards, Oudh, Bengal, Burma, Central and South India.

Growth moderate 6 to 7 rings per inch of radius Weight, the average of our specimens gives 48 lbs per cubic foot, Brandis says 41 lbs The fruit is eaten

O 542	Dehra Dun	lbs
O 1458	Bal raiich Oudh	49
O 1487	Kheri Oudh	17
C 2782	Melghát Barar	51
C 1186	Ahri Reserve Central Provinces	.
C 2756	Moharli Reserve, Central Provinces	49
W 932	North Kanara	46

2- *R. dumetorum*, Lam , Beddome cxxxii , Brandis 273, Gamble 48 *Posoqueria dumetorum*, Willd , Roxb Fl Ind : 713 Vern *Mindla*, *mandkolla*, *arara*, Pb., *Mainphal*, *manyul*, *karhar*, *main*, *manh'ri*, *manneul*, *arar*, Hind , *Maidal*, *amukh*, Nep , *Gundrow*, *Mechu*; *Guról*, *Rajbranshi*, *Panji*, *Lepcha*, *Patua*, *Uriya*, *Madu karray*, Tam , *Manda*, Tel , *Gera*, *galay*, Mar , *Kuay*, *katul*, *Gondi*, *Bhita*, *Kurku*, *Karé*, Kan

A deciduous thorny shrub or small tree, with grey bark Wood white or light brown, compact, hard Structure the same as that of *R uliginosa*.

Throughout India, extending in the North West Outer Himalaya as far as the Bra

Growth moderate 7 rings per inch of radius according to our specimens, Brandis says slow that "a section of a tree known to be 65 years old 4-inch radius hollow inside showed 51 annual rings on 2 inches of the radius near the circumference Weight 55 lbs per cubic foot Wood used for agricultural implements fences and fuel The bark of the root and stem and the fruit are used in native medicine the latter as an emetic The fruit is also used to poison fish, and when ripe is roasted and eaten

O 262	Garhwal (1869)	lbs
O 1306	Gonda Oudh	51
O 1461	Bahrach Oith	51
O 1488	Kheri Oudh	62
C 2759	Moharli Reserve Central Provinces (young)	51
C 2799	Melghát, Barar (young)	45
F 481	} Khookloong forest, Darjeeling Terai	49
E 433		...
F 2456	Bamunpokri, Darjeeling Terai	.

3. *R. tetrasperma*, Bth and Hook f , Brandis 272 *Gardenia tetrasperma*, Roxb Fl Ind : 709 Vern *Bara garra*, *batya gin,aru*, Kumaun

very hard  
Medullary

Himalaya, from the Indus to Bhotan, ascending to 6000 feet  
Weight, 56 lbs per cubic foot

H 137	Sirha 6000 feet	lbs
H 2421	5000 "	61

## 10. GARDENIA, Linn.

Contains 12 to 15 Indian species of shrubs or trees. *G. gummifera*, Linn.; Roxb. Fl. Ind. i. 708; Beddome cxxxiv. 1; Brandis 270. Vern. *Dekdmali*, *kamarri*, Hind.; *Chitta matta*, *chitnityal*, *gaggaru*, Tel.; *Chitta*, *bikke*, *kambi*, Kan., is a large shrub of Central and South India, with a white hard wood, and giving a yellow gum resin. *G. montana*, Roxb. Fl. Ind. i. 709. Vern. *Teliga*, *tella kakisha*, Tel., is a small tree of South India. *G. coronaria*, Ham.; Kurz ii. 43, is a tree of Chittagong and Burma, with a heavy, close-grained wood. *G. sessiliflora*, Wall.; Kurz ii. 40. Vern. *Majeeboub*, Burm., is a tree of the hills of Burma. Kurz describes several other Chittagong and Burma species of less importance. *G. florida*, Linn., of Indian gardens, is an introduction from China.

Wood smooth, close-grained, hard. Pores small to extremely small, numerous, uniformly distributed. Medullary rays very fine to moderately broad.

1. *G. turgida*, Roxb. Fl. Ind. i. 711; Beddome cxxxiv. 1.; Brandis 270; Kurz ii. 41. Vern. *Thanella*, *khurrur*, *khuriari*, *ghurga*, *mhaner*, Hind.; *Karhar*, Banda; *Panjra*, *pendra*, Gondi; *Phurpata*, Kurku; *Khurphendra*, *pendri*, *phanda*, *phetra*, Mar.; *Phetrak*, Bhil; *Bamemia*, Uriya; *Manjunda*, *telél*, Tel.; *Bongeri*, Kan.; *Thamengsanee*, Burm.

A small deciduous tree. Bark smooth, bluish grey,  $\frac{1}{5}$  inch thick, compact. Wood close-grained, hard, white with a purplish tinge, no heartwood. Annual rings indistinct. Pores very small. Medullary rays fine and very fine, very numerous.

Sub-Himalayan tract from Nepal to the Jumna, ascending to 4,000 feet; Rajputana, Burma, Central and South India.

Growth slow, 13 rings per inch of radius. Weight, according to R. Thompson 56.5 lbs. per cubic foot; our specimens give 54 lbs. Wood good, but splits and cracks in seasoning.

		lbs.
O	541. Dehra Dún . . . . .	...
O	1377. Gonda, Oudh . . . . .	60
O	1463. Bahraich, Oudh . . . . .	...
O	1489. Kheri, Oudh . . . . .	50
C	826. Bairagarh Reserve, Berar . . . . .	54
C	2779. Melghát, Berar . . . . .	58
C	1142. Ahiri Reserve, Central Provinces . . . . .	54
W	993. North Kanara . . . . .	48

Nos. C 1248 and C 1309 (61 and 63 lbs.) sent from Gumsúr under the name *Gorahadu*, have the same structure as, and probably are, this species.

2. *G. lucida*, Roxb. Fl. Ind. i. 707; Beddome cxxxiv.; Brandis 271. *G. resinifera*, Roth.; Kurz ii. 42. Vern. *Dikamali*, Hind., Guz.; *Konda manga*, *kokkita*, *tetta manga*, C.P.; *Papar*, Bijeragogarh; *Karinga*, *karaingi*, *tella-manga*, Tel.; *Kumbi*, Tam.

A small deciduous tree. Bark  $\frac{1}{2}$  inch thick, greenish grey, exfoliating in irregular flakes. Wood yellowish white, close-grained, hard, no heartwood, no annual rings. Pores extremely small. Medullary rays very fine.

Central and South India, Chittagong.

Weight, 39 lbs. per cubic foot. Wood useful for turning; it is made into combs. It gives a gum resin from wounds in the bark. This gum is hard, opaque, yellow, greenish or brown, with a strong smell, and is used in the treatment of cutaneous diseases and to keep off flies and worms.

C 1185.	Ahiri Reserve, Central Provinces . . . . .	39
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**3** *G. latifolia*, Aiton, Roxb Fl Ind 1 706 (? cf Brandis 272), Beddome cxxxiv 1, Brandis 271 Vern *Papra*, *páphar*, *pepero*, *ban pindálu*, Hind, *Pannia bhil*, *gúngat*, *bhandara*, *geggar*, Gondi, *Phiphar*, *malí*, Bugis, *Kumbay*, Tam, *Pedda laringa*, *pureea*, *bikli*, *garger*, Tel, *Kota-ranga*, Uriya, *Ghogar*, *gogarhí*, Mar, *Gogar*, Bhil

A small deciduous tree. Bark  $\frac{1}{4}$  inch thick, greenish grey, exfoliating and leaving smooth, conchoidal, rounded depressions. Wood light-yellowish brown, close and even grained, hard, handsomely mottled, neither warps nor splits. No heartwood. Marked concentric annual rings. Pores extremely small, numerous. Medullary rays fine, short.

Sub Himalayan tract from the Jumna eastwards. Bengal, Central and South India.

of it

		cubic foot
		substitute for
		are made

B 1173 Ahiri Reserve Central Provinces

lbs

B 2733 Moharli Reserve, Central Provinces

53  
50

**4.** *G. obtusifolia*, Roxb., Kurz n 42 Vern. *Yengkhat*, Burm

A small deciduous tree with thin, grey bark. Wood white, moderately hard, even-grained. Pores small. Medullary rays moderately broad, and a large number of very fine rays, which are not very distinct.

Burma

Weight 55 lbs per cubic foot. It yields a yellow pellucid resin.

lbs  
55

B 817 Rangoon Division, Burma

**5** *G. costata*, Roxb Fl Ind 1 704 *G. coronaria*, Ham, Kurz n 43 Vern *Yengkhat*, *tsaythombyah*

A hard, rays plates, wood light brown, small Medullary long horizontal

Chittagong and Burma

Weight 49 lbs per cubic foot (Kurz with this Weight 49 lbs)

B 284 Burma (1867)

lbs  
50

B 2540 , (1862)

52

# 11 GUETTARDA, Linn

**1** *G. speciosa*, Linn, Roxb Fl Ind 1 686, Beddome cxxxiv 4, Kurz n 87 Vern *Domdomah*, And, *Nil piteha*, Cingh

A moderate-sized evergreen tree with thin grey bark. Wood yellow, with a tinge of red. Pores small, often in radial lines. Medullary rays, moderately broad and very fine.

\* Tidal forests along the shores of the Andaman Islands and Ceylon

B 1971 Andaman Islands (Kurz 1866)

lbs  
49

12. PLECTRONIA, Linn.

Contains 10 to 12 shrubs, part of which are found in South India and Ceylön, and part in Burma and the Andamans. *P. parviflora*, Roxb.; Beddome cxxxiv. 5; (*Canthium parviflorum*, Roxb. Fl. Ind. i. 534) Vern. *Balsu*, Tel., is a thorny shrub of South India, whose wood is hard and used for turning, and whose leaves are eaten in curries.

1. *P. didyma*, Bth. and Hook. f.; Kurz ii. 35. *Canthium didymum*, Gaertn.; Roxb. Fl. Ind. i. 535; Beddome t. 221; Brandis 276. Vern. *Tolan*, Uriya; *Neekanie, nalla balsu*, Tam., Tel.; *Abalu*, Kan.; *Arsül*, Bombay; *Poruwa*, Cingh.

A large shrub. Wood grey, hard. Pores very small, numerous, uniformly distributed. Medullary rays fine and very fine, numerous.

South India, Ceylon and Tenasserim.  
Weight, 57 lbs. per cubic foot. Wood used for agricultural purposes.

No. 16. Salem Collection	lbs. 57
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13. IXORA, Linn.

A large genus containing some 30 or more Indian and Burmese shrubs or small trees. Beddome describes 7 species from South India, and Kurz 24 (excluding *Pavetta*) from Burma, while many species come from Eastern Bengal and Assam. *I. coccinea*, Linn.; Roxb. Fl. Ind. i. 375; Beddome cxxxiv. 7; Kurz ii. 26 (*I. Bandhuca*, Roxb. Fl. Ind. ii. 376). Vern. *Rangun, rajana*, Beng.; *Bandhuka*, Sans., is a well-known scarlet-flowered shrub called the "Flame of the Woods," indigenous in South India, Chittagong and Burma and cultivated in gardens all over India. *I. stricta*, Roxb. Fl. Ind. i. 379; Kurz ii. 26, is another scarlet-flowered species from Tenasserim. *I. acuminata*, Roxb. Fl. Ind. i. 383; Gamble 48. Vern. *Churipat*, Nep., is a handsome shrub of Sikkim, Assam and Eastern Bengal with large, crowded corymbs of scented white flowers. *I. undulata*, Roxb. Fl. Ind. i. 385; Gamble 48. Vern. *Palukajui*, Beng.; *Pari*, Nep.; *Takchirnyok*, Lepcha, is a small tree of Bengal, and *I. villosa*, Roxb. Fl. Ind. i. 383. Vern. *Chunari*, Beng., of Sylhet. *I. barbata*, Roxb., and *I. polyantha*, Wight; Beddome cxxxiv. 7, are small trees of the Western Ghâts.

1. *I. parviflora*, Vahl.; Roxb. Fl. Ind. i. 383; Beddome t. 222; Brandis 275; Kurz ii. 21. The Torch Tree. Vern. *Kota gandhal*, Hind.; *Rangan*, Beng.; *Disti*, Gondi; *Kúrat, lokandi*, Mar.; *Shulundu kora*, Tam.; *Karipal, kachipadél, tadda pallu*, Tel.; *Kori*, Gondi; *Korgi*, Kan.; *Tellu kurwan*, Uriya; *Maha ratambala*, Cingh.

An evergreen shrub or small tree. Bark  $\frac{1}{4}$  inch thick, dark brown, exfoliating in irregular rounded scales. Wood light brown, smooth, very hard, close-grained. No heartwood. Annual rings indistinct. Pores very small. Medullary rays very fine and very numerous.

Bengal, Burma, Central and South India.  
Growth moderate, 10 rings per inch of radius. Weight according to Skinner, No. 84 66 lbs.; our specimen gives 57 lbs. Skinner gives  $P = 717$ . The wood is well suited for turning and might do for engraving. Beddome says it is used for furniture and building purposes. The green branches are used for torches.

C 1156. Ahiri Reserve, Central Provinces	lbs. 57
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14. PAVETTA, Linn.

Contains 6 to 8 species of Indian shrubs or small trees. *P. indica*, Linn.; Beddome cxxxiv. 7; Brandis 275 (*Ixora Pavetta*, Roxb. Fl. Ind. i. 385; Kurz ii. 18.) Vern.

*Kukúra chúra*, Bang., *Patelli*, Tam; *Nani paputa, tapra*, Tel, *Patella*, Cingh, parts of Central India  
xxxiv 7, is a shrub of the  
4 other species, viz *I*  
*I weberaefolia*, from the  
631), from Chittagong

1. *P. tomentosa*, Smith; Beddome cxxxiv. 7, Brandis 275, *Ixora tomentosa*, Roxb. Fl. Ind 1 346, Kurz 11 19; Gamble 48 Vern *Padera*, Kumaun; *Jiti*, Beng.; *Sundól*, Lepcha, *Papiri, papatta, nam-paputa*, Tel  
A large shrub with thin, smooth, brownish grey bark. Wood light brown, hard, close grained. Pores extremely small. Medullary rays short, numerous, fine and very fine.

Sub-Himalayan tract from the Ganges eastwards, ascending to 4 000 feet, Bengal, South India and Burma

O 3086 Gondar, Oudh

lbs  
59

## 15 COFFEA, Linn

77, Kurz 11 28,  
found in most  
by Mechie and

1. *C. arabica*, Linn, Roxb Fl Ind 1 539, Beddome cxxxiv. 8, Brandis 276, Kurz 11 27, Gamble 49 Vern *Bua* (the berry), *Kahwa* (the same roasted and ground)

A shrub with thin grey bark. Wood white, moderately hard, close-grained. Pores very fine and extremely fine. Medullary rays very fine, numerous

Indigenous in Abyssinia and Soudan, cultivated since the fifteenth century in Arabia and introduced thence to India. It has been cultivated in many parts of India, but on a large scale only in Mysore, Coorg, the Western Ghats and Ceylon. It is occasionally found running wild in the forests. Growth moderate

P 3150 Coorg (20 25 years old)

*Prismatomeris tetrandra*, Hook f and Blh Genera Pl 11 119 (*Coffea tetrandra*, Roxb, Kurz 11 28) is an evergreen tree of the forests of Chittagong, the Martaban Hills and Andaman Islands up to 3,000 feet elevation.

## 16 MORINDA, Linn

evergreen scandent shrub or tree  
scarcely 5 other species from Burma





# 1 VERNONIA, Schreb

About 7 species of small trees or climbers *V. Wightiana* Blth and Hook f (*Monosis Wightiana* Beddome t 226) is a tree of the Nilgiri Hills *V. Kunzia*, C B Clarke, Kurz n 80 is a small tree of the toungyas in the Martaban Hills and *V. arborea* Ham is found in Tinasserim The other three species are Burmese climbers

1. *V. volkameriæfolia*, DC, Beddome t 225, Gamble 50 *V. acuminata*, DC, Kurz n 79

A small tree Bark brown Wood whitish, turning pale brown, moderately hard Pores moderate-sized, often in short radial lines Medullary rays numerous, fine and moderately broad Pith large

Eastern Himalaya South India and Burma  
Weight 31.5 lbs This is probably Kyd's *Vernonia (major)*—Weight 31.5 lbs  
P = 383

E 3312 Pankabari Darjeeling 3 000 feet

# 2 ARTEMISIA, Linn

Contains the ' Wormwoods' only one of which reaches the size of a small shrub The leaves of many species are used as a febrifuge and in the preparation of "absinthe"

1. *A. vulgaris*, Linn, Roxb Fl Ind n 420, Gamble 50 *Vern Naga, naga dona, dona*, Hind, Beng, *Titapat*, Nep

Bark thin, with longitudinal fissure Wood grey, hard Pores very small, in short radial lines between the distant, fine and moderately broad medullary rays

A gregarious shrub coming up on old cultivations between 3 000 and 6 000 feet in the Sikkim Hills and often covering large tracts of land until killed down by the tree growth which succeeds it This is probably the *Nagdana* of Cachar and by Mr Brownlow to be one of the plants on which the *Attacus Atlas* silkworm is fed

Its ashes when burnt are considered to give a good manure for cultivation

E 2357 Tukdah Forest Darjeeling 5 000 feet

## ORDER LVIII GOODENOVIÆ

*Scavola Kongu* Vahl Kurz n 84 (*S. Taccada*, Roxb Fl Ind n 527) *Vern*  
but in this Order by  
evergreen large shrub,  
It has a soft, spongy

## ORDER LIX VACCINIACEÆ

An Order of small trees or shrubs found in the mountains of the Himalayas and Southern India It contains 4 genera *Empetrum*, *Pentaptychium* and *Corallobotrys* *Agapetes corallina* Linn f 1759, *mothe* and *variegata* G Don (*Thilandia variegata* Vell Brit n 79 *Corallobotrys* Roxb Fl Ind n 413, *Vaccinium* Linn L 83) *Vern*





is a shrub, often epiphytic, of the Khasia and Gáro Hills, Sylhet, Chittagong and Tenasserim. *A. obovata*, Don (*Vaccinium obovatum*, Wight; Gamble 50) Vern. *Ratay*, Nep., is a common shrub of the hill forests of Sikkim and Bhutan. *A. saligna*, Bth. and Hook. f.; Gamble 50, is a large epiphytic shrub of the Sikkim Hills from 1,000 to 5,000 feet, whose leaves are said by Hooker to be used as a substitute for tea. *A. Wallichiana*, Wight, and *A. hirsuta*, Wight, are shrubs of Sylhet; *A. verticillata*, Wight, and *A. odontocera*, Wight, of the Khasia Hills and Burma; and *A. auriculata*, Griff., is an epiphytic shrub of Burma.

*Pentapterygium* contains 3 species, among which *P. serpens*, Bth.; Gamble 50. Vern. *Kali hurchu*, Nep.; *Kumbuten*, Lepcha, is a handsome epiphytic shrub common on trees and banks about Darjeeling.

*Corallobotrys acuminata*, Hook. f. and Bth. (*Vaccinium acuminatum*, Kurz ii. 90), is an evergreen shrub of Eastern Bengal and Burma.

## 1. VACCINIUM, Linn.

About 12 species, of which 4 occur on the Nilgiris and the rest in Eastern Bengal and Burma. *V. Leschenaultii*, Wight; Beddome t. 227. Vern. *Andúvan*, Nilgiris, is a pretty tree with an edible fruit, said by Beddome to have a fine-grained rose-coloured wood. *V. rotundifolium*, Wight, and *V. neilgherrense*, Wight; Beddome cxxxvi., are also small trees of the hills of South India. *V. Donianum*, Wight; Kurz ii. 91, is a large shrub of Burma and the Khasia Hills. *V. Dunalianum*, Wight, is an epiphytic shrub of Sikkim, Bhutan and the Khasia Hills.

1. *V. serratum*, Wight; Gamble 50. Vern. *Charu*, Nep.

A shrub, often epiphytic. Bark brown with white lenticels. Wood white. Pores extremely small. Medullary rays broad, wavy.

Sikkim, Bhutan and the Khasia Hills, from 4,000 to 8,000 feet.

E 3296. Babookhola, Darjeeling, 4,000 feet.

## ORDER LX. ERICACEÆ.

Contains about 6 Genera of usually handsome-flowered Indian trees or shrubs; some of these, however, especially the genera *Cassiope* and *Diplarche*, contain merely small prostrate heath-like plants, found in the Inner Himalaya. The Genera belong to 2 Tribes, viz.:—

Tribe I.—Andromedere . . . . . *Gaultheria*, *Cassiope*, *Pieris*  
and *Enkianthus*.

„ II.—Rhodoreæ . . . . . *Diplarche* and *Rhododendron*.

*Gaultheria* contains about 5 species. *G. fragrantissima*, Wall.; Beddome cxxxvi. Vern. *Kappúru*, Cingh., is a common shrub of the Nilgiri and Pulney Hills and Ceylon. *G. punctata*, Bl.; Kurz ii. 92 (in this he includes *G. fragrantissima*) is an evergreen shrub of the hill forests of Martaban at 6,000 to 7,000 feet; and *G. Griffithiana*, Wight; Gamble 51, is a small shrub of the hills of Sikkim and Bhutan from 7,000 to 9,000 feet. *Cassiope fastigiata*, Don, Vern. *Chhola lewar*, Beas; *Seeru*, Chor; *Kamba*, Kumaun, is the “Himalayan Heather” of travellers in the North-West Himalaya; it often covers large areas like the European heather. It was also found by Hooker in Sikkim at Mon Lepcha. The common “Heather” or “Ling” of Europe is *Calluna vulgaris*, Linn.

Bark generally thin. Wood compact; even-grained. Pores uniform and uniformly distributed, small or very small, numerous. Annual rings generally marked by belt of porous wood. Medullary rays short, generally fine or very fine.

# 1 PIERIS, Don.

*P lanceolata* Don is a small tree of the Khasi Hills and *P formosa* Don (*Andromeda formosa* Wall Brandis 280 Vern *Shcaboge*, Nep) an evergreen tree of the Himalaya from Kumaun to Bhutan

1 *P ovalifolia*, Don *Andromeda ovalifolia*, Wall , Brandis 280, Kurz ii 92, Gamble 50 Vern *Ayatta, eslan, ellal, arur, aivan, aira, rattankat, erana, yarta*, Pb , *Ayar*, Hind , *Anjir, angiar, aigiri, jag-guchal*, Nep , *Piazay*, Bhutia , *Kangshior*, Lepcha

A small deciduous tree Bark brown, peeling off in long narrow strips, deeply cleft, the clefts often extending spirally round the stem Wood light reddish brown, moderately hard Annual rings marked by numerous larger pores in the spring wood Pores small in the spring wood, very small in the autumn wood Medullary rays fine, short, marked on a radial section as long narrow bands

C H S T . . . . . and 8000 feet

18 rings per  
1 lbs per cubic  
only used for

fuel and charcoal The young leaves and buds are poisonous to goats they are used to kill insects and an infusion of them is applied in cutaneous diseases The bark of the Darjeeling tree is not so characteristically thick as that of the North West tree

H	17	Simla	7000 feet		lbs
E	3328	Darjeeling	6500 feet	.	41

# 2 ENKIANTHUS, Lour

1. *E himalaicus*, Hook f and Th , Gamble 50 Vern *Choklu*, Nep

A small tree with thin grey bark Wood white, moderately hard, even grained Annual rings marked by a belt of more numerous pores Pores very small and extremely small Medullary rays moderately broad and fine Numerous, wavy, fine, concentric bands of soft tissue

S 1 km Himalaya 10000 to 12000 feet

Growth slow 40 rings per inch of radius

E 976 Chumbi Valley Tibet about 10000 feet

# 3 RHODODENDRON, Linn

of great  
rth West  
ec es are  
l largest  
P. ...  
...  
...  
...  
...

with white or pale yellow flowers: *R. scelosum*, Don. Vern. *Tsalu*; Bhutia, a red-flowered shrub of Sikkim which, with the last, gives a very strong and somewhat unpleasant aromatic scent: and *R. lepidotum*, Wall.; Brandis 282; Gamble 52. Vern. *Tsaluma*, *tsuma*, Bhutia, with reddish flowers. *R. formosum*, Wall.; Kurz ii. 94, is a small shrub of the Khasia and Nattoung Hills, above 7,000 feet. *R. moulineanæ*, Hook.; Kurz ii. 94, an evergreen tree of the hills of Martaban and Tenasserim above 4,000 feet. *R. Hodgsoni*, Hook. f.; Gamble 5, is a small tree of Sikkim from the wood of which the Tibetan yak saddles are frequently made, and whose leaves are used for plates and lining baskets. *R. nivale*, Hook. f., found at 17,500 to 18,000 feet altitude in the Sikkim Himalaya, is a small shrub which probably attains the highest elevation of any known woody plant.

The Indian rhododendrons are all characterised by even-grained wood, soft or moderately hard; by very fine and extremely fine pores, more numerous in the spring wood; and by fine, generally short medullary rays. The wood is apt to warp, with the exception of that of *R. argenteum* and *R. Falconeri*.

1. *R. arboreum*, Sm.; Beddome t. 228; Brandis 281; Kurz ii. 93; Gamble 51. *R. puniceum*, Roxb. Fl. Ind. ii. 409. Vern. *Chhán*, Hazara; *Ardácal*, Jhelum; *Manál*, Chenab; *Chiu, áru*, Ravi; *Brás*, *bron*, *búrás*, *búrúnsh*, Beas to the Sarda River; *Brus*, Kumaun; *Bhorúns*, *gurás*, *ghonás*, *taggú*, *lal gurás*, Nep.; *Elok*, Bhutia, Lepcha; *Billi*, *poomaram*, Nilgiris; *Ma-ratmal*, Cingh.

A small evergreen tree. Bark 1 inch thick, reddish brown, peeling off in small flakes. Wood soft, reddish white or reddish brown, close and even-grained, apt to warp and shrink. Annual rings marked by a belt of slightly larger pores in the spring wood. Pores very small and extremely small, uniformly distributed. Medullary rays fine and moderately broad, short, visible on a radial section.

Outer Himalaya from the Indus to Bhutan between 3,000 and 11,000 feet, hills of Southern India and Ceylon, Karennee Hills in Burma.

Growth slow: according to Brandis 14 rings per inch of radius; our specimens give 12 rings for the North-West specimens, and 22 to 36 rings for those from Sikkim.

Weight, 41.4 lbs. per cubic foot on an average of 5 specimens, the Sikkim ones weighing 39, while the Simla specimens give 45 lbs. The wood seasons very badly, and is chiefly used for fuel and charcoal, but is also sometimes employed for building and for making dishes, in Sikkim for "kukri" handles, boxes and other small articles, and on the Nilgiris for gun-stocks and posts. The flowers are eaten and are made into preserves; they are commonly offered in temples.

		lbs.
H 3171.	Dungagalli, Hazara, 7,000 feet . . . . .	45
H 14.	Simla, 7,000 feet . . . . .	45
H 73.	Mashobra, Simla, 7,000 feet . . . . .	39
E 371.	Senchul forest, Darjeeling, 7,500 feet . . . . .	39
E 383. }	Tonglo, Darjeeling, 10,000 feet . . . . .	39
E 2388. }		

The two last are the species *R. Campbelliæ*, Hook. f.; Gamble 51, distinguished from *R. arboreum*, Sm., by the ferruginous tomentum and cordate base of the leaf, but probably only a variety.

2. *R. argenteum*, Hook. f.; Gamble 51. Vern. *Kali gurás*, *putlinga*, Nep.; *Elok-amat*, Lepcha.

An evergreen tree. Bark reddish brown, peeling off in small scales. Wood yellowish, with darker heartwood, shining, soft, close and even-grained. Pores very small, somewhat more numerous in the spring wood.

Medullary rays of two sizes, very fine and very numerous between fewer short and moderately broad rays

Hills of Sikkim common on the outer ranges round Darjeeling and Damsong from 6000 to 10000 feet

Growth slow 27 rings per inch of radius Weight 39 lbs per cubic foot The wood warps less than that of *R. arboreum* Flowers pure white with a purple throat

F 372 Tonglo, Darjeeling 9000 feet

lbs  
39

3 *R. Falconeri*, Hook f, Gamble 51 Vern *Kurlinga*, Nep, *Kégu*, Bhutia

A moderate sized evergreen tree Bark reddish brown, peeling off in flakes, inner bark purple red Wood reddish white, shining with a beautiful satiny lustre, takes a beautiful polish, hard Annual rings marked by more numerous pores in the spring wood Pores very small and extremely small Medullary rays fine and moderately broad, short

Hills of Sikkim especially the summit of Tonglo at 10000 feet

Growth slow 17 rings per inch of radius Weight 39 lbs per cubic foot Does not warp Flowers cream coloured

E 369 Tonglo Darjeeling 10000 feet

lbs  
39

4 *R. barbatum*, Wall, Gamble 51 Vern *Guras*, *chimal*, Nep, *Kénu*, Bhutia

A small evergreen tree Wood light pinkish red, shining Annual rings marked by a belt of more numerous and larger pores Pores very small and extremely small Medullary rays fine and very fine, numerous

Eastern Himalaya from 8000 to 11000 feet

Growth slow 30 rings per inch of radius Weight 39 lbs per cubic foot Flowers deep crimson

E 370 Tonglo Darjeeling 10000 feet

lbs  
39

5 *R. campanulatum*, Don, Brandis 281 Gamble 52 Vern *Gaggi*, *yumi*, Kashmir, *Saragar*, *shinwala*, Ravi *Shargar*, Beas, *Simrung*, Sutlej, *Chimul*, Kumaun, *Cheriala*, *tectosa* Nep

An evergreen shrub with thin grey bark Wood light pinkish red, moderately hard Annual rings distinctly marked by more numerous pores in the spring wood Pores very small and extremely small Medullary rays fine, very short

Inner Himalaya from the Indus to Nepal between 9500 and 14000 feet Outer ranges on Chor and Kedarkanta Sikkim at 11000 feet (C B Clarke)

Growth moderate to slow Our specimens shew 28 rings per inch of radius while Aitén with Wallich's specimens found 84 rings per inch very distinctly marked Weight 39 lbs per cubic foot Flowers light pink lilac or mauve

H 191 Jalari Pass Seoraj Kulu 10000 feet

H 128 Rotang Pass Kulu 13000 feet

lbs  
39

6 *R. fulgens*, Hook f, Gamble 51 Vern *Chimal*, Nep

A small tree or large shrub Wood grey, darker moderately hard, even grained Annual rings marked



wood at the inner edge. Pores very small. Medullary rays short, fine very numerous.

Sikkim Himalaya, from 12,000 to 14,000 feet.

Growth slow, 25 rings per inch of radius. Weight, 36 lbs. per cubic foot  
Flowers deep crimson.

E 2957. Sandúkpho, Darjeeling, 12,000 feet . . . . . lbs.  
36

7. *R. cinnabarinum*, Hook. f.; Gamble 51. Vern. *Búlú*, Nep.  
*Kema kechoong*, Lepcha.

A large shrub with thin grey bark. Wood grey, moderately hard even-grained, warps. Annual rings not visible. Pores very small. Medullary rays short, fine.

Sikkim Himalaya above 12,000 feet.

Weight, 42 lbs. per cubic foot. The leaves are poisonous and the smoke of the wood causes inflammation of the face and eyes, according to Hooker. Flowers scarlet

E 2958. Sandúkpho, Darjeeling, 12,000 feet . . . . . lbs.  
42

## ORDER LXI. EPACRIDEÆ.

An Australian Order, of which one species only extends north to Tenasserim, viz. *Leucopogon malayanus*, Jack; Kurz ii. 95, an evergreen, small, rigid shrub.

## ORDER LXII. PLUMBAGINEÆ.

An Order containing only one Indian species. *Ægialitis annulata*, R. Br. Kurz ii. 96 (*Æ. rotundifolia*, Roxb. Fl. Ind. ii. 111), is a small evergreen treelet with a conically thickened trunk, found in the tidal forests of the Sundarbans, Chittagong, Arracan, Burma and the Andaman Islands.

## ORDER LXIII. MYRSINEÆ.

Contains 6 Genera of Indian trees, shrubs, or climbers, belonging to the following Tribes:—

Tribes	I.—Mæseæ	. . . . .	<i>Mæsa</i> .
„	II.—Eumyrsineæ	. . . . .	<i>Myrsine</i> , <i>Samara</i> , <i>Ardisia</i> and <i>Ægiceras</i> .
„	III.—Theophrasteæ	. . . . .	<i>Reptonia</i> .

Wood compact, close-grained. Pores very small or extremely small often in groups and radial or oblique lines. Medullary rays distant, broad.

### 1. MÆSA, Forskal.

Contains 10 to 12 species of shrubs or trees. *M. indica* A. DC.; Beddome xxxvii.; Brandis 283; Kurz ii. 99; Gamble 52 (*Bæobotrys indica*, Roxb. Fl. Ind. i. 557) Vern. *Kalsis*, Kumaun; *Atki*, Bombay; *Bilauni*, Nep.; *Phadupjoh*, Mechi; *Ramjani*, Beng.; *Tamomban*, Magh, is a shrub of the Sub-Himalayan tract from the Ganges to Assam, Bengal, South India and Burma. *M. argentea*, Wall.; Brandis

283 Vern *Phusera, gassa* Hind " " shrub of the outer Himalayas

Long Burma and the Andamans  
Kurz to have a brown heavy close

L " wood

1 *M. montana*, A DC, under *M. indica*, A DC in Brandis 283, Gamble 52 Vern *Bilauni*, Nep, *Parma*, Lepcha

An evergreen, gregarious shrub or small tree Bark thin, reddish brown Wood soft Pores small, scanty, uniformly distributed Medullary rays moderately broad, numerous

North East Himalaya from Nepal eastwards Eastern Bengal and Burma (var *B. elongata* = *M. paniculata* A DC Kurz n 99) often forming coppice-like dense second growth forests at elevations from 3 000 to 6 000 feet on the Sikkim and Bhutan Hills

Growth rather fast 6 rings per inch of radius used only for fuel and rough house posts

E 2389 Tukdah Forest Darjeeling 6 000 feet

## 2 MYRSINE, Linn

Contains 3 to 5 species *M. capitellata* Wall Beddome t 234 Brandis 286 (*M. atenis* DC Kurz n 100) is a small tree of Eastern Bengal South India, Ceylon and Burma said by Beddome to have a hard and durable timber Weight 22 lbs (Wallich)

1 *M. semiserrata*, Wall, Brandis 285, Kurz n 105, Gamble 52 Vern *Parwana, kunkung gossa bamora, gaunta*, Hind, *Chupra*, Kumaun, *Bila, beresi, kalikatha, bilauni*, Nep, *Tungcheong*, Lepcha

A shrub, small or middling sized tree Bark ash-coloured, dark, nearly black with prominent dots Wood red, hard Pores extremely small, in small patches between the distant, broad medullary rays

Outer Himalaya from the Beris to Bhutan from 3 000 to 9 000 feet Nattoung Hills of Martaban

Wallich says the wood is chocolate coloured heavy hard handsome and used in Nepal for carpenters work It splits rather and is usually too small for anything but firewood

H 2430 The Glen Simla 6 000 feet

E 3322 Darjeeling 6 500 feet

lbs

51

—

2 *M. africana*, Linn, Brandis 286 Vern *Bebrang, kalhum, kolkhuri, karuk gugul, jutru, chachri, pratsku, branchu, khushin, papri, bandaru, bisisi, atuljan*, Pb *Guvaini, pahari cha, chupra*, North-Western Provinces

A small, evergreen shrub Wood white moderately hard Pores extremely small, often in short radial lines, between the distant, fine medullary rays

A & L

ng and often used

as a

is in ght be useful for hedges

H 2829 Simla 6 000 feet

lbs

49

wood at the inner edge. Pores very small. Medullary rays short, fine, very numerous.

Sikkim Himalaya, from 12,000 to 14,000 feet.

Growth slow, 25 rings per inch of radius. Weight, 36 lbs. per cubic foot. Flowers deep crimson.

E 2957. Sandúkpho, Darjeeling, 12,000 feet . . . . . lbs.  
36

7. *R. cinnabarinum*, Hook. f.; Gamble 51. Vern. *Búlú*, Nep.; *Kema kechoong*, Lepcha.

A large shrub with thin grey bark. Wood grey, moderately hard, even-grained, warps. Annual rings not visible. Pores very small. Medullary rays short, fine.

Sikkim Himalaya above 12,000 feet.

Weight, 42 lbs. per cubic foot. The leaves are poisonous and the smoke of the wood causes inflammation of the face and eyes, according to Hooker. Flowers scarlet.

E 2958. Sandúkpho, Darjeeling, 12,000 feet . . . . . lbs.  
42

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„	II.—Eumyrsineæ	. . . . .	<i>Myrsine</i> , <i>Samara</i> , <i>Ardisia</i> and <i>Ægiceras</i> .
„	III.—Theophrasteæ	. . . . .	<i>Reptonia</i> .

Wood compact, close-grained. Pores very small or extremely small, often in groups and radial or oblique lines. Medullary rays distant, broad.

### 1. MÆSA, Forskal.

Contains 10 to 12 species of shrubs or trees. *M. indica* A. DC.; Beddome cxxxvii.; Brandis 283; Kurz ii. 99; Gamble 52 (*Bæobotrys indica*, Roxb. Fl. Ind. i. 557) Vern. *Kalsis*, Kumaun; *Atki*, Bombay; *Bilauni*, Nep.; *Phadupjoh*, Mechi; *Ramjani*, Beng.; *Tamomban*, Magh, is a shrub of the Sub-Himalayan tract from the Ganges to Assam, Bengal, South India and Burma. *M. argentea*, Wall.; Brandis

283 Vern *Plusera, gansa.* II - 1

o shrub of the outer Himalaya, in  
amble 52 Vern *Phusera* Kumaun;  
all tree of the North East Himalaya,  
ca Wall, Kuriz 09 Vern *Mal*  
Chittagong, Burma and the Andes  
Kuriz to have a brown, heavy, close

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1

1. *M. montana*, A DC, under *M. indica*, A DC in Blandis 283, Gamble 52 Veru Bilauu, Nep, Purmo, Lepeha

An evergreen, gregarious shrub or small tree. Bark thin, reddish brown. Wood soft. Pores small, scanty, uniformly distributed. Medullary rays moderately broad, numerous.

North East Himalaya from Nepal eastwards. *ma* (var  
*D. elongata*  $\approx$  " " *ike dense*  
BECOF " " Bhutan  
Hill

house posts      2,000, 6 rings per inch of radius, used only for fuel and rough

E 2389 Tukdah Forest, Darjeeling, 6,000 feet

## 2. MYRSINE, Linn

Contains 3 to 5 species. *M. capitellata* Wall., Beddome t 231, Brandis 286 (*M. arenis*, DC., Kurz n 105), is a small tree of Eastern Bengal South India Ceylon and Birma, said by Beddome to have a hard and durable timber. Weight, 22 lbs (Wallich).

1. *M. semiserrata*, Wall , Brandis 285, Kurz n 106, Gamble 52.  
Vern *Parwana*, *kungkung gogsa*, *bamora*, *gaunta*, Hind , *Chupra*,  
Kumaun , *Bils*, *beresi*, *kalikatha*, *bilauni*, Nep , *Tungcheong*, Lepcha

A shrub, small or middling sized tree. Bark ash coloured, dark, nearly black, with prominent dots. Wood red, hard. Pores extremely small, in small patches between the distant, broad medullary rays.

Outer Himalaya from the Bets to Bhutan, from 3 000 to 9 000 feet Nattoung Hills of Martaban

Wallich says the wood is chocolate coloured, heavy, hard, handsome and used in Nepal for carpenters work. It splits rather and is usually too small for anything but firewood.

H 2830 The Glen Simla 6 000 feet

E 3322 Darjeeling 6 500 feet

2. *M. africana*, Linn, Burdis 286 Vern *Bebiang*, *kalkhum*, *lokharu*, *karuk*, *gugul*, *jutru*, *chackru*, *pratsku*, *branchu*, *khushin*, *papru*, *bandaru*, *binsu*, *atukhan*, Pb, *Guvainu*, *pakar cha*, *chupra*, North-Western Provinces

A small, evergreen shrub. Wood white, moderately hard. Pores extremely small, often in short radial lines, between the distant, fine medullary rays.

Afghanistan Salt Range and C  
Fruit used as an anthe and often used  
as a substitute for that of ... might be useful for bedres

H 2829      Similar 6 000 feet

## 3. SAMARA, Linn.

Contains about 10 species of shrubs or climbers, of which most are found in Eastern Bengal, South India and Burma. *S. Ribes*, Benth. and Hook. f. (*Embelia Ribes*, Burm.; Roxb. Fl. Ind. i. 586; Beddome cxxxviii.; Brandis 284; Kurz ii. 101; Gamble 53). Vern. *Bebrang*, Sylhet; *Himalcheri*, Nep.; *Karkannie*, Bombay, is a large climber of Eastern and Northern Bengal, South India, Ceylon and Burma. The berries are used as an anthelmintic, and are used to adulterate black pepper. *S. floribunda*, Bth. and Hook. f. (*Embelia floribunda*, Wall.; Kurz ii. 102; Gamble 53). Vern. *Himalcheri*, Nep.; *Payong*, Lepcha, is a large climber of the hills of Sikkim and of Nattoung in Burma. It has a pinkish-white wood with very broad medullary rays and large regular pores, sometimes subdivided and often in concentric lines. (E 3294, Sepoydura, Darjeeling, 6,000 feet.) *S. frondosa*, King; Gamble 52. Vern. *Amili*, Nep.; *Monkyourik*, Lepcha, is a common climber of the Darjeeling forests.

1. *S. robusta*, Benth. and Hook. f. *Embelia robusta*, Roxb. Fl. Ind. i. 587; Beddome cxxxvii.; Brandis 284; Kurz ii. 102; Gamble 53. Vern. *Amti*, *ambat*, *barbatti*, *byebering*, Bombay; *Bebrang*, Oudh; *Kopadalli*, Gondi; *Bharangeli*, Kurku; *Kalay bogoti*, Nep.; *Aipmwaynway*, Burm.

A large shrub or small tree. Bark  $\frac{1}{4}$  inch thick, brown, with horizontal cracks. Wood reddish. Pores small, often in groups or short radial lines, the transverse diameter many times smaller than the distance between the extremely broad medullary rays. Yellow spots shewing in the middle of the rays.

Sub-Himalayan tract from the Jumna eastwards, Bengal, Behar, Western India and Burma.

O 2478. Gonda, Oudh . . . . . lbs.  
37.

2. *S. undulata*, Benth. and Hook. f. *Choripetalum undulatum*, A. DC.; Gamble 53. Vern. *Amilpati*, Nep.

A climbing shrub. Bark brown, with prominent lenticels. Wood yellowish white, moderately hard. Pores moderate-sized, more numerous in the inner part of each annual ring. Medullary rays moderately broad to broad, short, well defined.

North-East Himalaya, 3,000 to 6,000 feet.

E 3302. Tukdah, Darjeeling, 5,000 feet.

## 4. ARDISIA, Sw.

Shrubs or small trees. Brandis describes 2 from the North-Western Himalaya; Beddome 9 species from South India and Ceylon; and Kurz 20 from Burma and the Andamans; while a large number occur in the North-Eastern Himalaya and Eastern Bengal. *A. humilis*, Vahl; Beddome cxxxix.; Brandis 287; Kurz ii. 110; Gamble 53 (*A. solanancea*, Roxb. Fl. Ind. i. 580), Vern. *Ban-jam*, Beng.; *Kadna*, Cuttack; *Conda-mayur*, Tel.; *Kantena*, *maya rawa*, C. Prov.; *Bodma gidda*, Mysore; *Gyengmaope*, Burm., is a large shrub of the moister zones of India and Burma, extending as far to the north-west as the Jumna. *A. floribunda*, Wall.; Brandis 287; Gamble 53, is a small tree of the Sub-Himalayan tract from the Jumna to Assam. *A. pauciflora*, Heyne, *A. paniculata*, Roxb., *A. rhomboidea*, Wight, and *A. elliptica*, Thunb.; Beddome cxxxviii., are common small trees of South India and Ceylon.

1. *A. crispa*, DC.; Kurz ii. 113. *A. crenulata*, Vent.; Gamble 53. Vern. *Chamlani*, Nep.; *Denyok*, Lepcha.

A small erect shrub. Wood white, moderately hard. Pores extremely small. Medullary rays short, broad.

elevations  
winter Very

E 3315 - Pograingbong, Darjeeling, 6,000 feet

5. *ÆGICERAS*, Gaertn.

1. *Æ. corniculata*, Blanco; Kunz n. 114 *Æ. majus*, Gaertn.;  
Beddome cxxxv.; Roxb. Fl. Ind. iii. 130. Vern. *Halsi*, *khalshi*, Beng.,  
*Bootayet*, Burm.

A small evergreen tree. Bark grey,  $\frac{1}{4}$  inch thick. Wood hard, close-  
grained. No annual rings Pores small, uniformly distributed Medul-  
lary rays short, scanty, between moderately broad and broad

Coast forests and tidal creeks of the Western Coast, Bengal, Burma and the  
Andaman Islands

Weight, 40 lbs per cubic foot Wood used for firewood and for native huts  
in Jessore.

E 406 Sundarbans . . . . . lbs  
10

5. *REPTONIA*, A. DC.

1. *R. buxifolia*, A. DC, Brandis 287. Vern *Gajar*, Afg.,  
*Gúrgúra*, Punjab.

A large evergreen shrub or small tree. Bark thin, dark grey,  
brown,  
deven-  
wavy,  
aring-

and darker tissue into irregularly-shaped figures, in which the  
fine, numerous and regularly distributed medullary rays are  
visible.

worthy of attention The fruit is

P 169 Kohat . . . . . lbs  
P 912. Salt Range . . . . . 71

ORDER LXIV. *SAPOTACEÆ*.

## 3. SAMARA, Linn.

Contains about 10 species of shrubs or climbers, of which most are found in Eastern Bengal, South India and Burma. *S. Ribes*, Benth. and Hook. f. (*Embelia Ribes*, Burm.; Roxb. Fl. Ind. i. 586; Beddome cxxxviii.; Brandis 284; Kurz ii. 101; Gamble 53). Vern. *Bebrang*, Sylhet; *Himalcheri*, Nep.; *Karkannie*, Bombay, is a large climber of Eastern and Northern Bengal, South India, Ceylon and Burma. The berries are used as an anthelmintic, and are used to adulterate black pepper. *S. floribunda*, Bth. and Hook. f. (*Embelia floribunda*, Wall.; Kurz ii. 102; Gamble 53). Vern. *Himalcheri*, Nep.; *Payong*, Lepcha, is a large climber of the hills of Sikkim and of Nattoung in Burma. It has a pinkish-white wood with very broad medullary rays and large regular pores, sometimes subdivided and often in concentric lines. (E 3294, Sepoydura, Darjeeling, 6,000 feet.) *S. frondosa*, King; Gamble 52. Vern. *Amili*, Nep.; *Monkyourik*, Lepcha, is a common climber of the Darjeeling forests.

1. *S. robusta*, Benth. and Hook. f. *Embelia robusta*, Roxb. Fl. Ind. i. 587; Beddome cxxxvii.; Brandis 284; Kurz ii. 102; Gamble 53. Vern. *Amti*, *ambat*, *barbatli*, *byebering*, Bombay; *Bebrang*, Oudh; *Kopadalli*, Gondi; *Bharangeli*, Kurku; *Kalay bogoti*, Nep.; *Aipmwaynway*, Burm.

A large shrub or small tree. Bark  $\frac{1}{4}$  inch thick, brown, with horizontal cracks. Wood reddish. Pores small, often in groups or short radial lines, the transverse diameter many times smaller than the distance between the extremely broad medullary rays. Yellow spots shewing in the middle of the rays.

Sub-Himalayan tract from the Jumna eastwards, Bengal, Behar, Western India and Burma.

O 2478. Gonda, Oudh . . . . . lbs.  
37.

2. *S. undulata*, Benth. and Hook. f. *Choripetalum undulatum*, A. DC.; Gamble 53. Vern. *Amilpati*, Nep.

A climbing shrub. Bark brown, with prominent lenticels. Wood yellowish white, moderately hard. Pores moderate-sized, more numerous in the inner part of each annual ring. Medullary rays moderately broad to broad, short, well defined.

North-East Himalaya, 3,000 to 6,000 feet.

E 3302. Tukdah, Darjeeling, 5,000 feet.

## 4. ARDISIA, Sw.

Shrubs or small trees. Brandis describes 2 from the North-Western Himalaya; Beddome 9 species from South India and Ceylon; and Kurz 20 from Burma and the Andamans; while a large number occur in the North-Eastern Himalaya and Eastern Bengal. *A. humilis*, Vahl.; Beddome cxxxix.; Brandis 287; Kurz ii. 110; Gamble 53 (*A. solanancea*, Roxb. Fl. Ind. i. 580), Vern. *Ban-jam*, Beng.; *Kadna*, Cuttack; *Conda-mayin*, Tel.; *Kantana*, *maya rawa*, C. Prov.; *Bodina gidda*, Mysore; *Gyengmaope*, Burm., is a large shrub of the moister zones of India and Burma, extending as far to the north-west as the Jumna. *A. floribunda*, Wall.; Brandis 287; Gamble 53, is a small tree of the Sub-Himalayan tract from the Jumna to Assam. *A. pauciflora*, Heyne, *A. paniculata*, Roxb., *A. rhomboidea*, Wight, and *A. elliptica*, Thunb.; Beddome cxxxviii., are common small trees of South India and Ceylon.

1. *A. crispa*, DC.; Kurz ii. 113. *A. crenulata*, Vent.; Gamble 53. Vern. *Chamlani*, Nep.; *Denyok*, Lepcha.

A small erect shrub. Wood white, moderately hard. Pores extremely small. Medullary rays short, broad.

Eastern Himalaya from 4000 to 8000 feet Martaban at similar elevations  
Has pretty wax like flowers and bright red berries which ripen in winter Very  
common undergrowth in the hill forests

E 3315 Pograingbong Darjeeling 6000 feet

# 5 *ÆGICERAS* Gaertn

1 *Æ corniculata*, Blanco, Kunz n 114 *Æ majus*, Gaertn ,  
Beddome catxix , Roxb Fl Ind iii 130 Vern *Halsi*, *khalsi*, Beng ,  
*Bootayet*, Burm

A small evergreen tree Bark grey,  $\frac{1}{4}$  inch thick Wood hard, close  
grained No annual rings Pores small, uniformly distributed Medul  
lary rays short, scanty, between moderately broad and broad

Coast forests and tidal creeks of the Western Coast Bengal Burma and the  
Andaman Islands

Weight 40 lbs per cubic foot Wood used for firewood and for native huts  
in Jessore

E 106 Sundarbans

lbs  
40

# 5 *REPTONIA*, A DC

1 *R buxifolia*, A DC , Brandis 287. Vern *Gajar*, Afg ,  
*Gurgura*, Punjab

A large evergreen shrub or small tree Bark thin, dark grey,  
tessellated by deep longitudinal and transverse cracks Wood light brown,  
with irregular purplish-brown heartwood, very hard, heavy close and even  
grained Annual rings indistinct Pores very small arranged in wavy,  
radial, branching and anastomosing narrow white belts, of varying  
width, joined by fine, wavy, concentric lines which divide the firmer  
and darker tissue into irregularly shaped figures, in which the white,  
fine numerous and regularly distributed medullary rays are distinctly  
visible

Salt Range and 1 lbs Trans Indus

Weight 71 lbs per cubic foot Wood worthy of attention The fruit is eaten  
and the seeds are strung in rosaries

P 169 Kohat  
P 912 Salt Range

lbs  
71

## ORDER LXIV SAPOTACEÆ



in gardens in India as far north as Saharapur for its fine, good-flavoured fruit. *Isonandra Wightiana*, DC.; Beddome exli., is a common tree of the Western Ghâts and Ceylon. *I. obovata*, Griff.; Kurz ii. 120 (probably *Dichopsis*), is an evergreen tree of Tenasserim yielding a sort of gutta-percha (B 2687, Tavoy, from Wallich, 1828, is perhaps this).

The *Argan* tree of Morocco which is found growing gregariously in forests in the Atlas Mountains is *Argania Sideroxylon*, R. S. Its leaves and fruit are used for fodder and an oil resembling olive oil is extracted from the seeds.

Wood hard, smooth, durable. Heartwood dark-coloured, generally red. Pores small and moderate-sized, in short, wavy, radial lines which are frequently oblique. Medullary rays numerous, fine, equidistant, joined by fine, transverse bars or concentric lines of softer texture.

### 1. CHRYSOPHYLLUM, Linn.

1. *C. Roxburghii*, G. Don; Beddome t. 236; Thwaites Enum. 174; Kurz ii. 118. *C. acuminatum*, Roxb. Fl. Ind. i. 599. The Star Apple. Vern. *Petukara*, Beng.; *Pithogarkh*, Ass.; *Ilali*, Kan.; *Tarsi*, Mar.; *Lawûlû*, Cingh.; *Thankya*, Burm.

An evergreen tree. Wood white, close-grained, moderately hard. Pores small, in short radial lines between the numerous, very fine medullary rays.

Bengal, Burma, Western Ghâts and Ceylon.

Weight, according to A. Mendis, 39 lbs. per cubic foot; Kyd gives weight 40.5 lbs. and P = 710. Wood used for building. Fruit edible.

No. 48. Ceylon Collection (called <i>Sideroxylon</i> sp.)	lbs.
	39

### 2. SARCOSPERMA, Hook. f.

Two trees of the Eastern Himalaya: *S. Griffithii*, Hook. f., and *S. arborea* Hook. f. (*Sideroxylon arboreum*, Ham.; Kurz in Trans. As. Soc. Beng. xlv. ii. 229; Gamble 53). Vern. *Pahar lampati*, Nep.; *Kulyatzo*, Lepcha, a large tree of the Eastern Himalaya which is used in Sikkim to make canoes.

No. E 3316 from Chenga Forest, Darjeeling Terai, is probably this. Bark light-reddish brown, thin; wood pink, moderately hard, rather light (30.5 lbs. per cubic foot). Pores moderate-sized, in long wavy, radial lines. Medullary rays very numerous, fine, equidistant, the distance between two rays much less than the diameter of the pores. Concentric lines very indistinct.

### 3. DICHOPSIS, Thw.

About 3 species: *D. elliptica*, Benth. and Hook. f. (*Bassia elliptica*, Dalz.; Beddome t. 43). Vern. *Panchoti pala*, Tam.; *Panchonta*, Kan., is a very large tree of the Western Ghâts, affording a good timber and an inferior description of gutta-percha. *D. caloneura*, Bth. and Hook. f. (*Isonandra caloneura*, Kurz ii. 119), is a tree of the Andaman Islands. *D. Gutta*, Bth. and Hook. f. (*Isonandra Gutta*, Hook.), is the tree which yields the "Gutta-Percha" of commerce, of which large quantities are exported to Europe from Singapore and the Malay Archipelago, where the tree is indigenous.

1. *D. polyantha*, Benth. and Hook. f. in Gen. Plant. ii. 658. *Bassia polyantha*, Wall. *Isonandra polyantha*, Kurz ii. 119. Vern. *Tali*, Beng.; *Sill-kurta*, Cachar; *Thainban*, Magh.

A moderate-sized evergreen tree. Wood red, hard. Pores moderate-sized, in wavy radial lines, sometimes slightly oblique. Medullary rays very fine, not prominent. Fine, wavy, parallel and equidistant concentric lines.

## Cachar Chittagong and Arracan

Weight, 53 lbs per cubic foot Much valued in Cachar and Chittagong Mann says it does not float but he must refer to green wood Kurz says it yields a good quality of gutta percha in large quantity Major Lewin says it is used in Chittagong for making beds tools, &c and is sawn into boards for the Calcutta market

F 1274	Cachar	lbs.
E 1434	Sylhet	53
E 1952	Chittagong	
E 3285	Rinkheong Reserve Chittagong	53

## 4 BASSIA, Kon

Contains 3 species of Indian trees with milky juice useful for their timber as well as for many other products

Wood moderately hard, heartwood red Pores moderate-sized, in short radial lines Medullary rays equidistant, the distance between the rays less than the transverse diameter of the pores

1. *B. latifolia*, Roxb Fl Ind ii 526, Beddome t 11, Brandis 289 Vern *Makwa, mowa, makua*, Hind , *Makwa, mahila maul*, Beng , *Moka*, Uiyar, *Illuppi, elupa, lat illipi*, Tam , *Ippi, yeppa*, Tel , *Maku*, Baigias, *Irup, irrip, irhu*, Gondli, *Moku*, Kurku, *Moko*, Mai , *Honge*, Kan , *Poonam*, Mal , *Quindah* (the oil)

A large deciduous tree Bark  $\frac{1}{2}$  inch thick, grey, with vertical cracks, exfoliating in thin scales Sapwood large, heartwood reddish brown, from hard to very hard Annual rings indistinct. Pores moderate sized, not numerous, in short, sometimes oblique, radial, wavy lines between the numerous, fine, medullary rays, which are joined by numerous parallel, fine, transverse bars

Indigenous in the forests of Central India Cultivated and self sown throughout India

The weight and transverse strength have been determined by the following experiments —

Experiment by whom made	Year	Wood whence procured	Weight	Number of experiments	Size of bar	Value of P
Cunningham	1854	Gwalior	63	1	Ft In I 2 x 1 x 1	715
Ekner No 23	1863	South India	60			00
Fowke	1909		63			63.
R Thompson	1868	Central Provinces	63			
List	1873		68	9		
Smythes	1878	As below	64			

it is rarely  
ddome says  
or furniture  
y parts of

India, t  
into a cc  
Bengal,  
in Chota  
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owners, ..

flowers are usually eaten mixed with *sāl* seeds or leaves of other plants. Full description of the collection in Palamow is given by Mr. L. R. Forbes quoted at page 243 of the same Volume. In that description he says that in the Palamow Sub-division there are nearly 114,000 *mahua* bearing trees. He says the average yield of a tree is about 2½ maunds, and that the flowers sell at about 12 annas per maund. The fruit, ripe or unripe, is eaten; it has two envelopes, the outer two of which are eaten raw or cooked as a vegetable, and the inner one is dried and ground into meal. From the kernel a greenish yellow oil is obtained, which is eaten by the Gonds and other Central Indian tribes, and is used to adulterate ghee and in soap-making. It solidifies at a low temperature, but melts at a temperature of 110°; and though it keeps well in a cold climate, in a hot one it soon becomes rancid and separates into two parts, a clear fluid oil above, and a thick brown substance below. One seer of oil is obtained from 4 seers of kernels.

O 266.	Garhwal (1868)	lbs.
O 1493.	Kheri, Oudh	60
H 2969.	Kumaun, 5,000 feet	65
C 827.	Bairagarh Reserve, Berar	66
C 2771.	Melghát, Berar	69
C 1116.	Ahiri Reserve, Central Provinces	...
C 2731.	Moharli Reserve, Central Provinces (young)	60
C 1243.	Gumsúr, Madras	52
		63

2. *B. longifolia*, Willd.; Roxb. Fl. Ind. ii. 523; Beddome t. 42; Brandis 290. Vern. *Kat illupi*, *elupa*, Tam.; *Ippi*, *yeppa*, *pinna*, Tel.; *Hippe*, Kan.; *Ellupi*, Mal.; *Aee*, Cingh.

A large evergreen tree. Heartwood red, moderately hard, close-grained. Pores moderate-sized, prominent on a vertical section, in short radial lines between the uniform, equidistant, numerous, fine medullary rays which are joined by fine transverse bars.

South India and Ceylon.

Weight, according to Skinner, No. 23, 60 lbs.; Adrian Mendis 61 lbs. Skinner, gives P = 730, Mendis 724. Beddome says it is very flexible and durable; that it is valued for ship's keels, for trenails and for planking below the water line; and that it is used for carts, furniture and bridge construction. The flowers are eaten in the same way as those of *B. latifolia*, and an oil is expressed from the ripe fruit, which is yellow, semi-solid and used for burning, for soap, and to adulterate ghee. It is also used medicinally, as well as the leaves, bark and the juice of the bark and young fruit.

No. 53. Ceylon Collection . . . . . lbs.  
61

3. *B. butyracea*, Roxb. Fl. Ind. ii. 527; Brandis 290; Gamble 53. Vern. *Chirā*, *chāirā*, *phulel*, Kumaun; *Cheuli*, Oudh; *Phalwara*, Hind.; *Chiri*, Nep.; *Yel*, *yel pote*, Lepcha.

A deciduous tree. Bark ½ inch thick, dark grey, wood light brown, hard. Annual rings marked by a dark line. Pores moderate-sized, somewhat smaller than those of *B. latifolia*, in radial lines of different length between the numerous equidistant, fine medullary rays, which are joined by fine transverse bars.

Sub-Himalayan tract from Kumaun to Bhutan, between 1,500 and 4,500 feet.

Growth fast, 3 to 4 rings per inch of radius. Weight, 52 lbs. per cubic foot. The pulp of the fruit is eaten, and from the seeds a vegetable butter is extracted, of the consistence of fine lard and of a white colour. It does not melt under 120° and keeps a long time without deteriorating. It makes good soap, and is useful for candles as it is said to burn without smoke or unpleasant smell. When perfumed, it is used as an ointment and as an external application for rheumatism. The flowers are not eaten. The bark is used in Sikkim to poison fish.

E 622. Bamunpokri, Darjeeling . . . . . lbs.  
52

# 5 PAYENA, A DC

Two species *P. paralleloneura* Kurz n 121 is an evergreen tree of the tropical forests of Martaban and Tenasserim

1. *P. lucida*, DC, Kurz n 121 *Ceratophorus Wightii*, Hassl  
*Isonandra polyandra*, Wight Icon t 1589 Vern *Dolu-kunta*, Cachar

An evergreen tree Wood red, hard Pores moderate-sized, in short radial lines. Medullary rays very fine, very numerous, uniform, equidistant Numerous parallel, wavy, concentric lines, not very prominent

Cachar, Tenasserim (?)

Weight 45 lbs per cubic foot The wood is used for planking

E 1275 Cachar

lbs  
45

# 6 MIMUSOPS, Linn

Contains 4 Indian species *M. Roxburghiana*, Wight, Beddome cat, Brandis

building and for gun stocks

Evergreen trees Heartwood red, very hard Pores small, in oblique lines The distance between the rays equal to, or larger than, the transverse diameter of the pores Numerous wavy, concentric lines

1. *M. Elengi*, Linn, Roxb Fl Ind n 236, Beddome t 40, Brandis 293, Kurz n 123 Vern *Bukal, bohli*, Beng, Mar, *Mulsun, maulser*, Hind, *Magadam*, Tam, *Pogada*, Tel, *Bokal, boklu, mugali*, Kan, *Barsoli*, Meywar *Faioli, oralli*, Mai, *Elengi*, Mal, *Khaya*, Burm, *Moonemal* Cingh

A large evergreen tree Bark dark grey, tough, deeply cracked with vertical and transverse fissures Sapwood large, whitish, very hard Heartwood red Pores small, in short lines, which are generally radial, but often irregular Medullary rays very fine, very numerous, uniform and equidistant Many parallel, wavy, concentric bands

W 1212 North W 1212 North W 1212 North W 1212 North W 1212 North

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W 1223	North K. nara	lbs
D 1073	Arcot	62
B 2224	Andaman Islands	60
B 2241		58
No 56	Ceylon Collection	61
No 13	Salem Collection (marked <i>Bassia longifolia</i> )	87

2. *M. indica*, A. DC.; Brandis 291. *M. hexandra*, Roxb. Fl. Ind. ii. 238.; Beddome cxli. Vern. *Khîr*, *khîrni*, Hind.; *Rain*, Meywar; *Palla*, *kannu palle*, Tam.; *Palle panlo*, *palla pandu*, Tel.; *Khîrni*, Mar.; *Raini*, Gondi; *Palû*, Cingh.

A large evergreen tree. Heartwood red, very hard. Pores small, in wavy, radial and oblique lines. Medullary rays fine, uniform, equidistant, very numerous. Concentric wavy lines irregularly distributed and less prominent than in *M. Elengi*.

Mountains of South India extending in Central India to the sandstone hills of Pachmarhi, north of the Godavari. It is only found on sandstone, and frequently associated with *Buchanania angustifolia* and *Hardwickia binata*.

Weight, Skinner, No. 95, gives 70 lbs.; A. Mendis 68 lbs.; our specimen gives only 60 lbs. per cubic foot. Skinner gives  $P = 944$ , Mendis 1,052. The wood is tough, even-grained and durable; it is used for sugar-mill beams, oil-presses, house-posts and for turning. The fruit is eaten.

D 1283.	Anamalai Hills	lbs.
No. 65.	Ceylon Collection	60
		68

3. *M. littoralis*, Kurz ii. 123. *M. indica*, Kurz, And. Report; Brandis 292. Andaman Bullet Wood. Vern. *Kappali*, Burm.; *Dogola*, And.

A large evergreen tree with thin, smooth, dark-brown bark. Wood red, smooth, very hard and close-grained. Pores extremely small, elongated, subdivided, often in radial lines. Medullary rays very fine, very numerous, uniform and equidistant. Numerous parallel, equidistant, fine, wavy, concentric lines.

Coast forests of the Andaman Islands and Tenasserim, in the Andamans, forming nearly pure forests on the level lands behind the beach and the mangrove swamps.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom conducted.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar used.	Value of P.
					Ft. In. In.	
Brandis . . .	1864	Andamans . . .	67	7	6 × 2 × 2	748
" . . .	"	" . . .	66	7	6 × 2 × 1½	963
" . . .	"	" . . .	69	11	2 × 1 × ¾	1,001
" . . .	"	" . . .	71	6	2 × 1 × 1	779
" . . .	1865-66	" . . .	65	3	6 × 2 × 2	981
" . . .	"	" . . .	64	1	6 × 2 × 1½	1,090
" . . .	"	" . . .	68	8	2 × 1 × ¾	1,266
Bennett . . .	1872	" . . .	66	...	.....	1,128
Smythies . . .	1878	" . . .	72	3	.....	.....

The wood is handsome, it is close-grained and durable, but apt to split. It is used in the Andamans for bridges and house-posts, and Major Ford (1866) said it had been sent to Calcutta to be tried for sleepers. He also says the bark is used to give a red dye.

B 513.	Andaman Islands	lbs.
B 2212.	" (1866)	41
B 2497.	" (Home, 1874, No. 6)	75
		72

## ORDRE LXV EBENACEÆ.

Containing 2 Indian Genera of trees or shrubs *Maba* and *Diospyros*. A full description of all the species of this Order is found in Mr W P Hiern's Monograph of the Ebenaceæ Cambridge Phil Soc Trans xii 1873

*Maba* contains 5 species *M nigrescens* Dalz and Gibs Bombay Flora, p 142 Vern *Raktrura*, Kan, is a small tree of the Western Ghats *M burzifolia* Pers., Beddome cxlviii Kurz ii 139 (*Ferriola burzifolia* Willd., Roxb Fl Ind iii 790) Vern *Iramballi cruciati humbilla* Tam, *Nella maddi alli pishinna* Tel, *Kalu habaraleya* Cingh, *Mepy young* Burm, is a small evergreen tree of South India and Tenasserim, it is said to have a dark coloured, hard and durable wood weighing according to Skinner No 89 58 lbs, P = 875 *M micrantha* Hiern (*Holochilus micranthus*, Dalz, Beddome cxlvii) is a tree of the Sahyadri hills of the Bombay Ghats *M merguensis*, Hiern, Kurz ii 139, is a small tree of the Mergui Archipelago *M andamanica* Kurz ii 140 is an evergreen shrub of the Andaman Islands (see page 253)

## I DIOSPYROS, Linn

Contains 41 or 42 species. From the list given below, which has been taken from Mr Hiern's Monograph it will be seen that 4 species are found in Northern India, 15 each in Burma and South India 9 in Eastern Bengal and 6 in the Andamans, most of the Ceylon species have been omitted —

## Section I MELONIA—

1	<i>D insignis</i> , Thw	S India Ceylon
2	<i>D Tupru</i> Buch	N India
3	<i>D Melanoxydon</i> Roxb	S India
4	<i>D sylvatica</i> Roxb	S India Ceylon
5	<i>D Kurzii</i> , Hiern	Andamans
6	<i>D ehretioides</i> Wall	Burma
7	<i>D hirsuta</i> Linn f	S India Ceylon
8	<i>D burmanica</i> Kurz	Burma
9	<i>D densiflora</i> , Wall	Burma

## Section II EBENUS—

10	<i>D oocarpa</i> Thw	S India, Ceylon
11	<i>D quasita</i> , Thw	Ceylon

## Section III NOLITA—

12	<i>D Brandisiana</i> Kurz	Burma
13	<i>D pruriens</i> Dalz	S India Ceylon

## Section IV GUNISANTHUS—

14	<i>D foliolosa</i> , Wall	E India
15	<i>D pilosula</i> , Wall	E Bengal Burma Andamans
16	<i>D paniculata</i> , Dalz	S India

## Section V GUIACANA—

17	<i>D Horsfieldii</i> , Hiern	Burma
----	------------------------------	-------

## Section VII ERMELINUS—

18	<i>D stricta</i> Roxb	E Bengal
19	<i>D variegata</i> Kurz	Burma
20	<i>D dasyphylla</i> Kurz	Burma
21	<i>D oleifolia</i> Wall	Burma
22	<i>D flavicans</i> Hiern	Burma Andamans
23	<i>D sapotoides</i> Kurz	Burma
24	<i>D nigricans</i> Wall	E Bengal
25	<i>D Eben im</i> , Don	S India, Ceylon,



closely packed. In most species there are numerous wavy, concentric lines across the rays. In several respects the structure of the ebonies resembles the structure of *Sapotaceæ*.

1 *D. Melanoxylon*, Roxb Fl Ind ii 530, Brandis 294 *D. Hightiana*, Beddome t 67 (Including *D. Tupia*, Buch, *D. exsculpta*, Ham, Beddome t 68, and *D. tomentosa*, Roxb Fl Ind ii 532) Vern *Tendu*, *kendu*, *temru*, *abrus* Hind, *Kend*, *kyou*, Bang, *Tumri tummer*, *tumki*, *Gondi*, *Tendu*, Bugas, *Tumri*, *temru*, *timburni*, Mai, *Tumbi*, *tumbali*, *karunthumbi*, Tam, *Tumi*, *tumki*, *tumida*, *timmuri*, *damadi*, Tel, *Kendhu*, Umyr, *Balai*, Kan.

A moderate sized tree. Burl  $\frac{1}{2}$  inch thick greyish black, the inner substance black and charcoal-like, with numerous transverse and longitudinal cracks exfoliating in regular oblong scales. Wood hard, of a light pink colour, with irregular shaped masses of black ebony in the centre. No annual rings. Pores small, scanty, generally in radial lines. Medullary rays very fine, very numerous, equidistant and uniform, visible on a radial section. Numerous fine, wavy, concentric lines visible in the sapwood. The ebony is jet black with purple streaks, extremely hard, pores and medullary rays difficult to distinguish.

Throughout India but not in Burma.

The weight and transverse strength have been determined by the following experiments —

Puckle in 1809 in Mysore with bars $2 \times 1 \times 1$	found $W = 75$
Skinner in 1862 No 62	$W = 80$ $P = 1180$
Cunningham in 1854 in Gwahar with bars $2 \times 1 \times 1$	$W = 77$ $P = 862$
The Central Provinces List of 1873	gives $W = 85$

Kyd found  $W = 49.5$   $P = 547$  R Thompson 496 this was probably the outer wood, Wallich gives 61 Smythies measurements of our specimens gave outer wood 54 lbs. ebony 72 lbs. but the good specimens with only ebony weigh 77 which is the best weight to take and which accords with Brandis statement that the weight per cubic foot varies from 75 to 80 lbs. Besides Skinners and Cunningham's values for P. Powke gives  $P = 756$ . The wood is used for building shoulder poles and carriage shafts and the ebony for all purposes of fancy work and carving. The fruit is edible.

		lbs
P 170	Hoshiarpur Punjab (Stewart 1866) the specimen referred to at p 137 of the Punjab Plants	69
P 460	Ajmere	59
O 1492	Kher Oudh	50
O 2981	Bulach Oudh	48
C 828	Ba nagarh Reserve Berar	53
C 1113	Ahri Reserve Central Provinces	
C 2751	Moharh Reserve Central Provinces	
C 1237	Gumsur Madras	65
C 1301		77
C 1302		68
D 2006	Mysore	73
D 2045		70
No 26	Salem Collection	82

2 *D. Kurzii*, Hiern, Kurz ii 131 Andamanese Marble Wood Vern *Teakah*, *thitkya* Burma, *Pechada*, And

An evergreen tree with small flowers. Wood handsome, streaked with black. The very hard, with grey wood. The



mass of ebony occupying the centre of the tree is large and very irregular in outline, and frequently encloses interrupted concentric belts of light-coloured wood. Pores small and very small, often oval and subdivided, between the very fine and extremely numerous, uniform and equidistant, wavy, medullary rays. Numerous, very fine transverse bars across the rays.

#### Andaman Islands.

Weight of the ebony 80 lbs. per cubic foot; the specimens partly ebony, partly grey wood, give 57 to 62 lbs. Brandis in his Memo. of August 25th, 1874, gives 70 lbs. The wood is used for cabinet work and should be better known, as a substitute for the Ceylon Calamander wood, which it resembles in appearance. It is said by Major Ford to be used in the Andamans for handles and sheaths of blades, and for furniture. Home's surveys gave 224 trees or 1 tree per acre; so it is pretty common.

B 2203.	Andaman Islands (1866)	. . . . .	lbs.
B 2498.	" "	(Home, 1874, No. 15)	57
B 521.	" "	. . . . .	80
			62

### 3. *D. ehretioides*, Wall.; Kurz ii. 129. Vern. *Ouk-chingza*, Burm.

A large tree with dark-grey bark. Wood dark grey, with darker streaks, moderately hard, even-grained. Pores moderate-sized, scanty, often oval and subdivided. Medullary rays fine, numerous. Numerous fine, wavy, concentric lines across the rays.

#### Burma.

Weight, according to Brandis' List of 1862, No. 73, 41 lbs.; our specimens give 53 lbs. The wood is used for house-posts.

B 1422.	Tharrawaddi, Burma	. . . . .	lbs.
B 2542.	Burma (1862)	. . . . .	54
			52

### 4. *D. oocarpa*, Thw. Enum. 180. Vern. *Kadoembaireya*, Cingh.

Wood purplish brown, with black streaks, moderately hard. Pores moderate-sized. Medullary rays very fine, very numerous. Numerous fine, wavy, concentric lines.

#### Concan, Mysore and Ceylon.

A handsome wood. Weight, 45 lbs. per cubic foot.

No. 40.	Ceylon Collection (marked <i>Diospyros</i> sp.)	. . . . .	lbs.
			45

### 5. *D. quæsita*, Thwaites Enum. 179; Beddome cxlv.; Brandis 296. Calamander Wood. Vern. *Kaloomidereya*, Cingh.

A large tree. Wood hard, consisting of irregular alternate layers of black ebony and greyish brown wood. Pores scanty, moderate-sized, in short radial lines. Medullary rays fine, numerous, equidistant, traversed by innumerable wavy concentric lines.

#### Ceylon.

Weight, according to Adrian Mendis' List, 57 lbs. per cubic foot; Skinner, No. 62, 60 lbs.; our specimen gives 53 lbs. Skinner gives P = 751.

The most valuable ornamental wood in Ceylon; it is now scarce, but is much in demand.

D 2923.	S. India or Ceylon	. . . . .	lbs.
No. 12.	Ceylon Collection ( <i>D. hirsuta</i> )	. . . . .	53
			57

6 *D. Ebenum*, König, Roxb Fl Ind ii 529, Beddome t 65, Brandis 296, Thwaites Enum 179 Ebony Vern *Ebans, abnus, tendu*, Hind , *Kendhu*, Uriya , *Acha, tumbi, shengulan, kaka tati, tai*, Tam , *Tuli*, Tel , *Aaremarra*, Kan , *Tai, tendu, abnus*, Mar , *Mallali*,  
 " " " " " " " " " " " "

Structure of the wood similar slightly larger, oval and subdivided, not in radial lines The structure of the ebony is exceedingly indistinct

South India and Ceylon

Weight according to Beddome 81 lbs Adrian Mendis 71 lbs our specimens give 61 to 70 lbs A Mendis gives  $P=720$  The wood is used for inlaying and ornamental turnery but the demand for it is not very great

W 731	South Kanara	lbs
W 750		61
No 13	Ceylon Collection (marked <i>Diospyros</i> sp)	70
		71

7. *D. montana*, Roxb Fl Ind ii 538, Beddome cxliii, Brandis 296 Vern *Hirek, keindu, temru, pasendu*, Pb , *Tendu, dasaundu, lohari, bistend*, Hind , *Makar-tendi*, Banda, *Pasund*, Bhurtpur, *Temru*, Meywar, *Ambia* Banswara, *Hadru*, Panch Mehals, *Kanchan, kadal, patlewar, patwan*, C P., *Muchi tanki, yerragoda, micha tummurra, lel*, *Timru, timburni*, Mar , *Goindu, kala goindu, balkuniki, jagalagante*, Kan

A moderate sized tree, with thin, pinkish grey, smooth bark, when old exfoliating in thick irregular flakes Wood yellowish grey, soft, no heartwood, no annual rings Pores numerous, small, in radial lines between the closely packed medullary rays, which are very fine, and on a radial section distinctly visible as horizontal plates White streaks parallel to the medullary rays

Most parts of India except Sindh the Northern Punjab and Burma

Weight 45.5 lbs per cubic foot The wood is durable and would be good for furniture

C 192	Mandla Central Provinces (1870)	lbs
C 1167	Ahli Reserve Central Provinces	47
		44

8 *D. cordifolia*, Willd , Roxb Fl Ind ii 538, Beddome cxliii, Kurz ii 130 *D. montana*, Roxb (part), Brandis 296 Vern *Ban-gab*, Beng , *Vachana, kaka ulimera*, Tel , *Gyulbeng*, Burm

Wood reddish, moderately hard Pores small, often oval and subdivided Medullary rays very fine and very numerous, with fine, wavy, transverse lines across

" " " " " " " " " " " "

Kurz (evidently quoting Brandis List of 1862, 60 gives 70 lbs  $P=1017$ , but this may be a

E 715	Chittagong ( <i>Mowhlanda</i> Beng <i>Chaprala</i> Magh)	lbs
B 2541	Burma (1862)	45
		43

9. *D. Lotus*, Linn.; Brandis 297. Vern. *Analók, malók*, Ph.

A middle-sized tree with dark-brown or black tessellated bark. Wood grey, moderately hard, close-grained. Pores small, in radial groups. Medullary rays very fine, closely packed. No concentric lines.

Punjab Himalaya, in Hazara and Kashmir, from 2,500 to 6,000 feet; Afghanistan, Beluchistan, extending to Southern Europe (*Mathieu*, Fl. For. p. 205).

Growth slow, 10 rings per inch of radius (*Brandis*). The fruit is sweetish and is eaten fresh or dried, by the Afghans; *Mathieu* says that in Southern France it is eaten when half-rotten like the Medlar.

H 3183. Dungagalli, Hazara, 5,600 feet.

10. *D. Embryopteris*, Pers.; Beddome t. 69; Brandis 298; Kurz ii. 128. *D. glutinosa*, Roxb. Fl. Ind. ii. 533. *Embryopteris glutinifera*, Roxb. Vern. *Gáb, makur-kendi*, Beng., Hind.; *Kási*, Banda; *Kendu*, Ass.; *Gusrakendhu*, Uriya; *Tumbiku, pani-chika*, Tam.; *Tumil, tumika*, Tel.; *liolle-tupra*, Coorg; *Kusharta*, Kan.; *Timberce*, Cinch.

An evergreen shrub or small tree, with dark-green foliage and long shining leaves. Bark smooth, dark grey, almost black, with a greenish tinge. Wood white, moderately hard, close-grained. Pores small, scanty, in short radial lines. Medullary rays very fine, very numerous, uniform and equidistant.

Throughout India and Burma, except the arid and dry zones in the Punjab and Sindh.

Growth moderate, 7-8 rings per inch of radius (*Brandis*). Weight, our specimen gives 53 lbs. per cubic foot. Wood used in building, in Ceylon for masts and yards.

The fruit is large, reddish; it contains a viscid pulp, which is used as gum in bookbinding, and in place of tar for paying the seams of fishing-boats. Its use for "gabing" boats is general throughout the rivers of Lower Bengal and Assam. An infusion is used to render fishing-nets durable. It is full of tannin and is used in medicine as an astringent. The oil extracted from the seeds is used in native medicine.

O 3161. Dehra Dún . . . . .	lbs. 52
-----------------------------	------------

11. *D. pyrrhocarpa*, Miq.; Kurz ii. 136. Vern. *Tay*, Burm.

An evergreen tree. Wood reddish brown, moderately hard to hard. Pores small, in short radial lines. Medullary rays very fine, closely packed, with fine transverse lines across them.

Andaman Islands.

Weight, 52 lbs. per cubic foot. Major Ford says the fruit is eaten by the Burmese and is used as a red dye for linen; that Chinese umbrellas are dyed with the juice, which also has the property of rendering them waterproof.

B 1991. Andaman Islands (Kurz, 1866) . . . . .	lbs. 50
B 2244. " " (1866) . . . . .	54

12. *D. sp.* from the Andamans (B 2232, 61 lbs.) Vern. *Moong*, Burm., has very small scanty pores, often in short radial lines between the closely-packed, very fine, uniform, medullary rays. No concentric lines; white streaks parallel to the medullary rays.

Major Ford says that "the wood is hard, compact and close-grained, dark-purplish grey with narrow streaks of jet black ebony. The bark and fruit of this tree produce a beautiful black dye. The Burmese use the wood for flutes and other wind instruments, for earrings, carved images, tool handles, picture frames, &c. The black heart-

wood of large trees has a diameter of about 4 or 5 inches It may possibly be *D. fillosula*, Wall

13 B 1097 collected on the Andamans by Kurz in 1866 and marked *D. undulata* (Hingado) is a large tree with small black wood in the centre of large trees Wood purplish grey Pores small sometimes in short radial lines between the closely packed very fine undulating, medullary rays Weight 49 lbs Numerous wavy concentric lines

B 2172 from Andamans (Kurz 1866) marked *Mabanga* (Hingado) with bluish grey wood is similar in structure to the preceding number Weight 49 lbs per cubic foot

## ORDER LXVI STYRACEÆ

Cont contains 112 tree of a small benjamin or benzoin of inferior quality tree of the Ma taban Hills *S. Ben* of the Malay Archipelago yields the true Gum Benzoin which is used in medicine in perfumery and to make incense *S. officinale* of the Levant yields the gum known as Storax used in medicine and perfumery

E 33.0 Darjeeling 6500 feet probably *S. argatum* Wall has a thin bark white close grained moderately hard wood with faint white regular concentric bands The pores are scanty, usually subdivided, and the medullary rays short fine very numerous

## 1 SIMPLOCOS, Linn

Contains 20 to 30 species of Indian trees generally small *S. spicata* Roxb 146 Gamble 54 Vern *Bootigan* Burghers is a resin whose leaves are used in dyeing and whose seeds are strung as beads and hung round children's necks to prevent evil *S. racemosa* Roxb Fl Ind n 539 Brads 300 Kurz n 144 Gamble 53 Vern Lodh Beng *Clamla* Bhutia is a common small chiefly in dry forests The le

tree is used to make a resin in Assam

Wood white, close grained, apt to warp and split Pores very small Medullary rays very fine

1 *S. cratægoides*, Hamilton, Brandis 298, Kurz n 147 Vern *Lu, landar, loy, losh, Pb, Loh, Kumaun, Loya, Sutlej*

A large shrub or small tree Bark light grey, corky, with long vertical cracks Wood white, hard, close grained, splits and twists in seasoning Pores small and very small, uniformly distributed Medullary rays numerous, fine and very fine Annual rings visible

Himalaya from the Indus to Assam between 3000 and 8000 feet Khasia Hills, Hills of Martaban

Growth slow, 15 rings per inch of radius. Weight, 45 to 54 lbs. per cubic foot. Wood durable, has been recommended for turning and would do for carving properly seasoned. The leaves and bark give a yellow dye. This may be the tree on which, according to Mr. Brownlow of Cachar, the silkworms *Attacus At* and *A. Canningi* are fed.

- |         |  |      |    |
|---------|--|------|----|
| H 54.   | Nagkanda, Simla, 7,000 feet . . . . .        | lbs. | 54 |
| H 2880. | " " " " " " " " " " " "                      | "    | "  |
| H 3018. | Kotgarh, " " " " " " " " " " " "             | "    | "  |
| H 429.  | Kuruwa Forest, Jaunsar, 6,000 feet . . . . . | "    | 45 |

**2. *S. lucida*, Wall.; Kurz ii. 143; Gamble 54.** Vern. *Khara*.  
Nep.; *Chashing*, Bhutia.  
A small evergreen tree. Bark thin, brown. Wood white, soft.  
Annual rings distinctly marked by a continuous line of pores. Pores very small, numerous. Medullary rays fine and very fine, numerous.

Sikkim Himalaya and hills of Martaban.  
Growth moderate, 6 to 11 rings per inch of radius. Weight, 36 lbs. per cubic foot. Used for fuel and rough house-posts.

- |         |                                      |      |    |
|---------|--------------------------------------|------|----|
| E 2390. | Rangbúl Forest, Darjeeling . . . . . | lbs. | 36 |
|---------|--------------------------------------|------|----|

**3. *S. ramosissima*, Wall.; Brandis 299; Gamble 54.** Vern. *Lodh*,  
Hind.; *Kala kharani*, *silingi*, Nep; *Tungchong*, Lepcha.  
A small evergreen tree with dark red bark. Wood white, soft, even-grained. Pores numerous, very small. Medullary rays fine and very fine, unequally distributed. Annual rings visible.

Himalaya from the Jumna to Bhutan ascending to 7,500 feet, Khasia Hills.  
Growth moderate, 6 to 9 rings per inch of radius. Weight, 37 lbs. per cubic foot.  
Brandis says that in Sikkim the yellow silkworm is fed on its leaves.

- |         |   |      |    |
|---------|---|------|----|
| E 367.  | Rangbúl, Darjeeling, 7,000 feet . . . . . | lbs. | 37 |
| E 3336. | Rangrúm, Darjeeling, 6,000 feet . . . . . | "    | "  |

**4. *S. sp.*; Gamble 54.** Vern. *Lal chandan*, Nep.  
Wood white, soft, close-grained. Annual rings marked by a white line. Pores extremely small. Medullary rays fine, numerous. Wood with vertical streaks of bright red colour; the red wood, which is most abundant in the root, is pounded and used for caste marks by Nepalese.

- |         |   |      |    |
|---------|---|------|----|
| E 370.  | Kalapokri, Darjeeling, 9,000 feet . . . . . | lbs. | 45 |
| E 2391. | Thosum La, Dumsong, 8,000 feet . . . . .    | "    | "  |
- (It is possible that this may prove to be *Daphniphyllum himalayense*, Müll. Arg.).

## ORDER LXVII. OLEACEÆ.

Contains 10 Indian Genera, belonging to 4 Tribes, viz.:—

- |        |               |           |  |
|--------|---------------|-----------|--|
| Tribes | I.—Jasmineæ   | . . . . . | <i>Jasminum</i> and <i>Nyctanthes</i> .  |
| "      | II.—Syringææ  | . . . . . | <i>Schrebera</i> and <i>Syringa</i> .  |
| "      | III.—Fraxineæ | . . . . . | <i>Fraxinus</i> .  |
| "      | IV.—Oleineæ   | . . . . . | <i>Osmanthus</i> , <i>Linociera</i> , <i>Olea</i> ,<br><i>Ligustrum</i> and <i>Myxopyrum</i> . |
- Nyctanthes Arbor-tristis*, Linn.; Roxb. Fl. Ind. i. 86; Beddome t. 240; Brandis Kurz ii. 155. Vern. *Har*, *siháru*, *harsinghar*, *saherwa*, *seoli*, *nibari*, Hind.; *nghar*, *sepháliká*, Beng.; *Pakúra*, *ladúri*, *kúri*, Pb.; *Sháli*, Meywar;

*Kirsahar*, Bugas; *Kherari* Gondi; *Gongo scoli* Uriya, *Aharash* Mar, *Karassi* Bhil, *Uinjaju pangala*, Tam, *Paghada* Larchid Til, *Harsing* Kan, *Tauy beeloo* Birm is a large shrub of the Sub-Himalayan forests from the Glenab to the Sarda Oudh Bengal Central India and Birma with a brown, close-grained wood used only for fuel. The leaves are used for polishing wood, and the flowers give an orange dye. It is often cultivated for ornament. *MyrOPYrum smilacifolium* Bl Kurz ii 160 is a climbing shrub of the Darjaling Terai Eastern Bengal Chittagong and Martaban.

Wood with few exceptions light coloured, moderately hard or hard, most species without heartwood. In the genera *Fraxinus*, *Jasminum*, *Syringa* and *Ligustrum*, the annual rings are marked by continuous lines or belts of pores. In the other genera the pores are small and uniformly distributed, except in *Osmanthus*, where they are in reticulate tails. Medullary rays sharply defined.

## 1 JASMINUM, Linn

Contains a large number

*J. Sambac* Aiton Roxb Fl

Hind *Mallikaphal* Beng

rated throughout India

(*J. pubescens* Roxb Fl Ind i

Nep is a common shrub of the Sub Himalayan tract from the Jumna eastwards Bengal and the Central Provinces

1 *J. revolutum*, Sims, Brandis 313 Vern *Chamba*, *juari*, *tsonu*, *tsuman*, *summun*, *luja*, Pb, *Sonajahi*, Kumaun

A small shrub with soft, thin, grey bark. Wood white, moderately hard, even grained. Annual rings marked by a narrow continuous belt of pores, which are small, while the pores in the outer part of the ring are extremely small. Medullary rays extremely fine, very numerous.

Afghanistan Salt Range Himalaya from the Indus to Nepal N Igiris and Ceylon Growth slow 25 to 40 rings per inch of radius

H 2891 H 3027 Nagkanda Simla 7 000 feet

lbs  
45

1 150

culti

s 313

*Dassi*

of the Salt Range  
8 000 feet) have

## 2 SCHREBERA, Roxb

1 *S. swietenoides*, Roxb Fl Ind i 109, Beddomet 248, Brandis 305, Kurz ii 156 Vern *Moka*, *goki*, *ghant*, *gantha*, Hind, *Patali*, *ghanta pati*, *linga*, Tam, Kurku, B

A dec

irregular scales. Wood brownish grey, hard, close grained, polishes well. No heartwood, but irregular masses of purple or chest coloured wood in the centre, and scattered throughout the tree. Annual rings indistinct. Pores small, uniformly distributed, often in radial groups.

Medullary rays fine, numerous, uniform and at equal distances, conspicuous on a radial section as narrow plates.

Kumaun, Burma, Central and South India.

Weight, 56 lbs. per cubic foot; Brandis says 50 lbs. The wood is durable, works freely and does not warp or split. It is used for combs, weavers' beams and turning.

		lbs.
C 829.	Bairagarh Reserve, Berar . . . . .	59
C 2772.	Melghát, Berar . . . . .	...
C 193.	Mandla, Central Provinces (1870) . . . . .	51
C 1108.	Ahri Reserve, Central Provinces . . . . .	...
C 1410.	Moharli " " . . . . .	...
B 1413.	Burma . . . . .	59
B 3149.	" (1862) . . . . .	54

### 3. SYRINGA, Linn.

Contains 2 species. *S. persica*, Linn.; Brandis 306. Vern. *Híásmín*, Kashmir, is a glabrous shrub found wild by Dr. Stewart at 8,000 feet on the Suliman Range and cultivated in the Punjab and Kashmir. *S. vulgaris*, Linn., is the "Lilac" so much prized in European gardens and occasionally cultivated in the Himalaya.

1. *S. Emodi*, Wall.; Brandis 306. Vern. *Ban phúnt*, *ban dakhúr*, *banchír*, *razli*, *juari*, *rangkrún*, *kehimu*, *lolti*, *leila*, *shafri*, *shapri*, *duden*, *chilanghati*, Pb.; *Ghia*, Kumaun.

A large shrub with grey bark,  $\frac{1}{10}$  inch thick. Wood smooth, hard, with a small, dark-coloured heartwood. Annual rings well marked by a narrow porous belt. Pores small in the spring wood, extremely small and arranged in irregular groups in the autumn wood. Medullary rays fine, numerous.

Safed-koh, North-West Himalaya from the Indus to the Sarda, ascending to 11,000 feet.

Growth slow, 20 rings per inch of radius. Weight, 59 lbs. per cubic foot.

		lbs.
H 2911.	Nagkanda, Simla, 8,000 feet . . . . .	...
H 3023.	" " 9,000 " . . . . .	59

### 4. FRAXINUS, Tournef.

Contains 3 Indian species found in the North-West Himalaya. *F. excelsior*, Linn.; Brandis 303. Vern. *Súm*, *kúm*, Pb. The Ash, is found in the valleys of the Jhelum, Chenab and Ravi between 4,000 and 6,000 feet. *F. Moorcroftiana*, Wall.; Brandis 304. Vern. *Shang*, Afg.; *Hanúz*, *ních*, *shilli*, *chúj*, *siju*, *chúm*, *thúm*, *sandal*, *shangal*, *butru*, Pb.; *Auga*, *gaha*, North-Western Provinces, is a large shrub or small tree of Afghanistan, the Trans-Indus and the North-West Himalaya from the Jhelum to Kumaun. It is often gregarious, has a slow growth (20 rings per inch of radius) and a light-brown, heavy, hard, close-grained wood which is used for tool handles and makes good fuel.

Wood moderately hard, white in some species; with a brown heartwood. Pores large and numerous in the spring wood; small, scanty and often arranged in groups in the autumn wood. Medullary rays fine, uniform, equidistant. In *F. floribunda*, *excelsior*, and other species the wood consists of alternate layers of soft porous spring wood, and hard, compact, autumn wood.

1. *F. floribunda*, Wall.; Brandis 302. Vern. *Banárish*, Afg.; *Súm*, *súnnu*, *shún*, *kúm*, *hamu*, *túnnú*, Pb.; *Angan*, *angu*, *dakkúri*, North-Western Provinces; *Kangu*, *tahási*, Nep.

etum, Hook. f. and Th.; Brandis 310.

Bark grey,  $\frac{1}{2}$  inch thick. Wood white, moderately rings marked by a narrow porous belt. Pores small in l, extremely small in the autumn wood. Medullary rays in a, numerous.

Himalaya from the Beas to the Sarda, at 3 500 to 6,000 feet  
17 rings per inch of radius Weight, 64 lbs. per cubic foot.

ot, Simla, 6,000 feet	lbs. 64
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### 8. LINOCIERA, Swartz.

at 6 species *L. intermedia*, Wight (*Chionanthus intermedia*,  
1) and *L. malabarica*, Wall (*C. malabarica*, Beddome cliv) are large  
in Ghats, while Kurz under *Chionanthus* describes 4 species from  
Andamans  
2 *L. macrophylla* ~ . . . . .  
3 the Sikkim Gar . . . . .  
4 6" ringed in . . . . .  
5 t res. . . . .

## VIII. SALVADORACEÆ.

*lora* and *Azima* *Azima tetraacantha*, Lamk; Kurz  
a thorny shrub of South India and Burma It is very  
ark are used in native medicine as an expectorant

### SALVADORA, Linn.

xb Fl. Ind 1. 389, Brandis 315 *S. Wrighti*-  
tooth-brush Tree. Vern *Arák, irak*, Arab;  
' ; *Jhál*, Rajputana, *Kauri án, kauri-jal*,  
Tam., *Waragu-wenki, ghunia*, Tel.; *Pítu*,

with thin grey bark. Wood white, soft.  
lines, but enclosed in oval patches of soft tissue  
bands of soft tissue, separating broader bands  
he fine and numerous medullary rays are dis-

Guzerat, Konkan and the Circars.

il, but in favourable circumstances attains 30 to 40  
crooked and fluted, 8 10 feet long and 4 5 feet in girth.  
as 14 feet 9 inches in girth Weight, 40 5 lbs.  
specimen gives 38 lbs It is very little used and  
3 are used as tooth cleaners, the root bark is very  
a blister, the shoots and leaves are pungent, but  
ison, they are eaten as salad and given as fodder  
bitter and aromatic, and is used medicinally.

lbs.

38



Medullary rays fine, numerous, uniform and at equal distances, conspicuous on a radial section as narrow plates.

Kumaun, Burma, Central and South India.

Weight, 56 lbs. per cubic foot; Brandis says 50 lbs. The wood is durable, works freely and does not warp or split. It is used for combs, weavers' beams and turning.

C 829.	Bairagarh Reserve, Berar								lbs.
C 2772.	Melghát, Berar								59
C 193.	Mandla, Central Provinces (1870)								...
C 1108.	Ahiri Reserve, Central Provinces								51
C 1410.	Moharli "								...
B 1413.	Burma								...
B 3149.	" (1862)								...

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Contains 2 species  
a glabrous shrub for  
cultivated in the P  
in European gar

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chilangha

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a new

1. *L. compactum*, Hook. f. and Th ; Brandis 310.

A large shrub. Bark grey,  $\frac{1}{2}$  inch thick Wood white, moderately hard Annual rings marked by a narrow porous belt. Pores small in the spring wood, extremely small in the autumn wood Medullary rays fine and very fine, numerous.

North West Himalaya from the Beas to the Sarda at 3 500 to 6 000 feet  
Growth slow, 17 rings per inch of radius Weight, 6½ lbs per cubic foot

H 3059 Koti, Simla, 6,000 feet

lbs  
64

## 8. LINOCIERA, Swartz.

\* Contains about 6 species *L. intermedia*, Wight (*Chionanthus intermedia*, Beddome t 239) and *L. malabarica*, Wall (*C. malabarica*, Beddome div) are large trees of the Western Ghâts, while Kurz under *Chionanthus* describes 4 species from Burma and the Andamans

No 3211 is *L. macrophylla* " " " " "  
cultivated tree in the Saharanpur Gar  
white wood, pores small, arranged in  
bent where they touch the pores

## ORDER LXVIII SALVADORACEÆ.

Contains 2 genera *Salvadora* and *Azima* *Azima tetracantha*, Lamk , Kurz n 161, is a straggling, dioecious thorny shrub of South India and Burma It is very common and the leaves and bark are used in native medicine as an expectorant (Wight III t 152, p 156)

## 1. SALVADORA, Linn.

1. *S. persica*, Linn , Roxb Fl Ind 1 389, Brandis 315 *S. Wrightiana*, Beddome t 247. The Tooth-brush Tree Vern *Arak, irak, Aiab , Kabbar, kharidjar, palu*, Sind , *Jhâl*, Rajputana, *Kauri iân, kauri jal, jhâl, jhit*, Pb , *Ôpa, ughai*, Tam , *Waragu-wenki, ghunia*, Tel , *Pîlu*, Mar.

A small evergreen tree, with thin grey bark Wood white, soft Pores small, in short radial lines, but enclosed in oval patches of soft tissue Numerous fine concentric bands of soft tissue, separating broader bands of firm texture, in which the fine and numerous medullary rays are distinctly visible

Wild in Sind, Rajputana, Guzerat, Konkan and the Circars

The tree is generally small but a few specimens are met with 20 to 30 feet, with a short trunk, (

Specimens have been seen

(Dalzell), 45 lbs (Fenne

is not even a good fuel The twigs are used as tooth cleaners, the root bark is very acrid and acts on the skin like a blister, the shoots and leaves are pungent, but are considered as an antidote to poison they are eaten as salad and given as fodder to camels, the fruit also is pungent, bitter and aromatic, and is used medicinally.

P 1331 Sind . . . . .

bs  
38

1. *O. ferruginea*, Royle; Brandis 576. *O. cuspidata*, Wall.; Brandis 307. Vern. *Khwan, shwan*, Trans.-Indus; *Zaitún*, Afg.; *Ko, kohú, káo, kau*, Pb.; *Kau*, Hind.; *Khan*, Sind.

A moderate-sized deciduous tree. Bark grey, thin, smooth when young, when old exfoliating in large narrow strips. Sapwood whitish; heartwood large, regularly shaped, from light brown or olive brown to nearly black, smooth, extremely hard. Annual rings distinctly marked by a belt of closely-packed pores. Pores in the rest of the annual ring extremely small, in irregular patches of soft tissue. Medullary rays fine, uniform, very numerous, equidistant.

Sind; Suliman Range, Salt Range, North-West Himalaya, extending as far as the Jumna eastwards, and ascending to 6,000 feet.

Weight, 65 to 82 lbs. per cubic foot, averaging 73 lbs. Brandis says that Sind wood weighs 65 lbs., but his specimen from the Sind hills reaches 82 lbs. The wood polishes well and is highly prized for turning, for combs, agricultural implements and fuel. The fruit is eaten, but is rarely found on the trees owing to the fondness of crows for it. Oil has been extracted from it, but only in small quantity though of good quality. The wood is worth trying as a substitute for boxwood or for the wood of the European olive and for inlaying work, as it is often prettily marbled.

		lbs.
H 162.	Shahpur (Stewart, 1866)	65
H 118.	Vaziri-Rupi, 4,000 feet	73
H 779.	Chamba, 3,500 feet	71
H 425.	Koti Forest, Jaunsar, 6,000 feet	75
P 2729.	Hills of Sind	82

2. *O. glandulifera*, Wall.: Beddome t. 238; Brandis 309. *O. paniculata*, Roxb. Fl. Ind. i. 105, not *paniculata*, R. Brown (an Australian species). Vern. *Gúllí, raban, síra, phalsh*, Pb.; *Gair, galdú, garúr*, Kumaun.

A moderate-sized tree. Bark  $\frac{1}{2}$  inch thick, grey, uneven, exfoliating in brittle scales. Wood reddish grey, hard. Annual rings marked by a distinct line. Pores moderate-sized, oval, subdivided, uniformly distributed. Medullary rays fine, numerous, prominent on a radial section.

Outer Himalaya from the Indus to Nepal, between 2,500 and 6,000 feet. Nilgiris and Anamalai Hills in South India.

A section of a tree 43 years old, in the Botanic Gardens, Calcutta, shewed 43 rings on a radius of 10 inches (Brandis); this would give 4.3 rings per inch or fast growth: our specimens give 12 to 33 rings per inch of radius. Weight, on an average, 54.5 lbs.

The wood is durable, takes a good polish and is not liable to be eaten by insects.

Linn.; Brandis 303. Vern. .

Jhelum, Chenab and Ravi;

		lbs.
Brandis 304.	Vern. <i>Shang</i> , Afg., 3,000 feet	59
	<i>shangal, butru</i> , Pb.; <i>Auga, ga</i> , 3,000 feet	55
	tree of Afghanistan, the Trans-Indus (1868)	50

to Kumaun. It is often gregarious.

and a light-brown, heavy, hard, close.

makes good fuel.

### FRUIT, Linn.

Wood moderately hard, white. Pores large and numerous in the wood. Pores large and numerous in the wood. *L. robustum*, Hook. f. and often arranged in groups in the wood. *Phillyrea robusta*, Roxb. Fl. Ind. i. uniform, equidistant. In *F. floribunda*, Kumaun eastwards, Bengal, Southern India and wood consists of alternate layers of *capalense*, Wall.; Roxb. Fl. Ind. i. 149; Brandis compact, autumn wood.

1. *F. floribunda*, Wall.; Brandis 304. Beddome cliv., is a shrub of Coorg. The *sánnu, shún, hím, hamu, túnnú*, Pb.; Western Provinces; *Kangu, tahási*, Nep.

1 *L. compactum*, Hook & Th., Brandis 310

A large shrub Bark grey,  $\frac{1}{2}$  inch thick Wood white, moderately hard Annual rings marked by a narrow porous belt Pores small in the spring wood, extremely small in the autumn wood Medullary rays fine and very fine, numerous

North West Himalaya from the Beas to the Sarda at 3 500 to 6 000 feet  
Growth slow 17 rings per inch of radius Weight 64 lbs per cubic foot

H 3059 Koti, Simla 6 000 feet

lbs  
64

8 LINOCIERA, Swartz

\*Contains about 6 species *L. intermedia* Wight (*Chionanthus intermedia* Beddome t. 239) and *L. malabarica* Wall (*C. malabarica* Beddome cliv.) are large trees of the Western Ghats while Kurz under *Chionanthus* describes 4 species from Burma and the Andamans

bent where they touch the pores

ORDER LXVIII SALVADORACEÆ

Contains 2 genera *Salvadora* and *Azima* *Azima tetraacantha* Lamk Kurz ii 161 is a straggling decuous thorny shrub of South India and Burma It is very common and the leaves and bark are used in native medicine as an expectorant (Wight Ill t. 152 p. 156)

1. SALVADORA, Linn

1 *S. persica*, Linn., Roxb Fl Ind i 389, Brandis 315 *S. Wrightiana*, Beddome t. 247 The Tooth brush Tree Vern *Arak*, *irak* Arab, *Kabbar*, *kharidjar*, *pilu*, Sind, *Jhal*, Rajputana, *Kauri* *ian*, *kauri* *jal*, *ghar*, *ghit*, Pb, *Opa*, *ughai*, Tam, *Waragu wenki*, *ghunia*, Tel, *Pilu*, Mar

A small evergreen tree, with thin grey bark Wood white, soft

tinctly visible

feet  
Spec  
(Dalzell) 40 lbs (Krenner) our specimen gives 50 lbs it is very little used and  
The tree is a good tooth brush the wood is very  
but  
drier

2. *S. oleoides*, Linn. ; Brandis 316. Vern. *Kabbar, jhâr, diâr, mithi-diâr*, Sind ; *Jâl, vâa, vâni, mithi van*, Pb. ; *Jhal*, Hind. ; *Ughai, koku*, Tam. ; *Pîlu*, Mar.

A large evergreen shrub or tree. Bark  $\frac{1}{4}$  inch thick, whitish grey, tessellated. Wood light red, moderately hard, with small, irregular, purple heartwood. Pores large and small, oval, often subdivided into irregular patches of soft tissue, which are joined by wavy, irregular zigzag bands. Medullary rays fine, numerous, distinct, at unequal distances.

Arid zone. Sind and Punjab, often forming the greater part of the vegetation of the desert ; ascends to 3,000 feet in the Trans-Indus hills and to 2,400 feet in the Salt Range.

Weight, 49 lbs. (Brandis) ; our specimens give 54 lbs. (Punjab) and 38 lbs. (Sind). Wood sometimes used for building and agricultural implements, Persian wheels and the knee timbers of boats. Is a bad fuel and leaves a great deal of ash. The fruit is sweet and is eaten.

P 912.	Multân (with heartwood)	.	.	.	.	.	.	lbs.
P 1382.	Sind (no heartwood)	.	.	.	.	.	.	54
								38

## ORDER LXIX. APOCYNEÆ.

A large Order containing 33 genera, only a few of which are of any importance. They belong to 3 Tribes, viz.—

Tribe I.—Carisseeæ	.	.	.	.	<i>Allamanda, Willoughbeia, Chilocarpus, Melodinus, Winchia</i> and <i>Carissa</i> .
„ II.—Plumeriææ	.	.	.	.	<i>Rauwolfia, Alyxia, Hunteria, Thevetia, Cerbera, Ochrosia, Kopsia, Rhazya, Vinca, Plumeria, Ellertonia, Alstonia, Tabernamontana</i> and <i>Holarrhena</i> .
„ III.—Echitidææ	.	.	.	.	<i>Pallaris, Parsonsia, Pottsia, Wrightia, Nerium, Strophanthus, Parameria, Urceola, Ichnocarpus, Epigynum, Anodendron, Chone-morpha</i> and <i>Beaumontia</i> .

Among these genera, however, four contain only introduced plants. *Allamanda cathartica*, Linn. ; Kurz ii. 164, is a large yellow-flowered shrub from America, much cultivated in India and run wild in tidal backwaters of the Western Coast (*Beddome*). *Thevetia nerifolia*, Juss. ; Kurz ii. 168. Vern. *Zard kunêl*, Hind. ; *Hpayounghan*, Burm., is a handsome yellow-flowered small tree, much cultivated in Bengal and Burma. It has long narrow leaves and a hemispherical drupe, from the seeds of which a bright yellow oil can be obtained. *Vinca rosea*, Linn., the Madagascar Periwinkle, is a small pink-flowered shrub commonly planted in India and Burma. *Plumeria acutifolia*, Poiret ; Brandis 323 ; Kurz ii. 179 ; Gamble 55. Vern. *Gul achin, golainchi, chameli*, Hind. ; *Khair champa*, Bombay ; *Champa pungâr*, Gondi ; *Kanagala*, Kan. ; *Tayopsagah*, Burm., is a gouty-branched tree with large, yellowish white, fragrant flowers, commonly found in gardens in India and Burma. Van Someren calls it the “Pagoda tree.”

Seventeen other genera contain only climbing shrubs. *Willoughbeia* contains 2 species. *W. edulis*, Roxb. Fl. Ind. ii. 57 ; Kurz ii. 165. Vern. *Luti-am*, Beng., is a large climber of Chittagong with edible fruit. It yields a kind of caoutchouc, as does also *W. martabanica*, Wall. ; Kurz ii. 165. Vern. *Thit kyounknway*, Burm., of Tenasserim.

yield a superior kind of caoutchouc (to this genus also belongs *U. elastica*, Roxb., *Chilocarpus*, *Melodinus*, *Pottsia*, *Strophanthus*, *gynum*, and *Anodendron*,

*crusne*, Brandis 322 Vern *Fena*, Silt Range, *Gandera*, Trans Indus, *Sewar*, *sihar*, *ishicarg*, Sind, is a shrub of the arid zone of the Punjab Sind and Afghanistan, its wood is used for fuel, and the fruit and leaves in native medicine

Wood white, soft (hard in *Carissa*), without heartwood Pores small or very small Medullary rays very fine, very numerous *Alstonia* is anomalous in having moderate-sized pores, distant rays and concentric lines of soft texture

# 1 CARISSA, Linn

1 *C. diffusa*, Roxb Fl. Ind 1 689, Beddome cliv , Brandis 321 ; Kurz u 169. Vern *Karaunda*, Hind , *Gán*, *garna*, *garinda*, Pb , *Sanharunda*, Uriya, *Wakoilu*, Tel

A small, thorny, evergreen shrub, with light grey bark. Wood hard, smooth, close-grained, said when very old (in Kangia) to be black and fragrant (Brandis). Annual rings marked by an interrupted line of pores. Pores very small and extremely small Medullary rays very fine, very numerous

Wild in most parts of India, especially in the drier zones as in the plains of the Punjab, the Sub Himalayan tract up to 4,000 feet, and in Trans Indus territory, also on the coast of South Andaman (Kurz)

often forming undergrowth in forests of *Pinus* ally teak It spreads rapidly in clearings, coppices

It is used for turning and combs, and to make dry fences Growth slow, 16 rings per inch of radius

P 112 Bhaji, Sumtr, 4,000 feet

2. *S. oleoides*, Linn.; Brandis 316. Vern. *Kabbar, jhâr, diâr, mithi-diâr*, Sind; *Jâl, cân, cânî, mithi van*, Pb.; *Jhal*, Hind.; *Ughai, koku*, Tam.; *Pîls*, Mar.

A large evergreen shrub or tree. Bark  $\frac{1}{2}$  inch thick, whitish grey, tessellated. Wood light red, moderately hard, with small, irregular, purple heartwood. Pores large and small, oval, often subdivided into irregular patches of soft tissue, which are joined by wavy, irregular zigzag bands. Medullary rays fine, numerous, distinct, at unequal distances.

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P 912.	Multân (with heartwood)	.	.	.	.	.	.	lbs.
P 1382.	Sind (no heartwood)	.	.	.	.	.	.	51
								38

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" II.—Plumeriææ	.	.	.	.	<i>Rauwolfia, Alyxia, Hunteria, Thevetia, Cerbera, Ochrosia, Kopsia, Rhazya, Vinca, Plumeria, Ellev-tonia, Alstonia, Tabernaemontana</i> and <i>Holarrhena</i> .
" III.—Echitidææ	.	.	.	.	<i>Talluris, Parsonsia, Pottsia, Wrightia, Nerium, Strophanthus, Parame-ria, Urceola, Ichnocarpus, Epigynum, Anodendron, Chone-morpha</i> and <i>Beaumontia</i> .

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yield a superior kind of croutchouc (to this genus also belongs *U. elastica*, Roxb.,

caisne, Brandis 321 Vern *Kana*, Sut 1410, *Ganacia* 11418 Indus *Sewar*, *Sanar* *ishwari*, Sind is a shrub of the arid zone of the Punjab Sind and Afghanistan, its wood is used for fuel, and the fruit and leaves in native medicine

Wood white, soft (hard in *Carissa*), without heartwood Pores small or very small Medullary rays very fine, very numerous *Alstonia* is anomalous in having moderate sized pores, distant rays and concentric lines of soft texture

# 1 CARISSA, Linn

1 *C. diffusa*, Roxb Fl Ind 1 689, Beddome clvii, Brandis 321, Kurz ii 169 Vern *Karaunda*, Hind, *Gan, garna, garinda*, Pb, *San karunda*, Uriy, *Wakoilu*, Tel

A small, thorny, evergreen shrub, with light grey bark Wood hard, smooth, close-grained, said when very old (in Kangra) to be black and fragrant (Brandis) Annual rings marked by an interrupted line of pores Pores very small and extremely small Medullary rays very fine, very numerous

Wild in most parts of India especially in the drier zones as in the plains of the Punjab the Sub Himalayan tract up to 4000 feet, and in Trans Indus territory, in (Kurz)

often forming undergrowth in forests of *Pinus* ally teak It spreads rapidly in clearings, coppices

It is used for turning and combs and to

fences Growth slow, 10 rings per inch of radius

P 112 Bl agri Sunla 4000 feet



dry and 343 lbs. when wet, while common hemp only withstood 158 and 190 lbs. Royle says that a rope ( $1\frac{1}{2}$  inch) broke with 903 lbs., strong European rope breaking with 1,203 lbs. *M. Roylei*, Wight; Brandis 333. Vern. *Pathor*, Ohenab; *Tar, veri*, Salt Range; *Kurang*, Simla (H 3194. Naldehra, Simla, 6,000 feet, with a white porous wood and annual rings marked by large pores), and *M. lucida*, Edgew.; Brandis 333. Vern. *Dudhi*, Kumaun, are small climbers of the North-West Himalaya. *Pergularia* contains 2 species: *P. pallida*, W. and A.; Brandis 334; Kurz ii. 202. Vern. *Surkila*, Kumaun, of Northern India; and *P. odoratissima*, Linn.; Brandis 334; Kurz ii. 203; Gamble 56. Vern. *Kanja lita, kunjalt*, Beng.; *Simplobuk*, Lepcha, of Bengal, Burma and the North-West Himalaya as far as the Jumna, often cultivated.

*Leptadenia viminea*; Bth. and Hook. f. (*Orthanthera viminea*, Wight; Brandis 335) Vern. *Mowa, lancbar*, Trans-Indus; *Matti*, Beas; *Khip*, Delhi; *Kip*, Sind; *Chapkia*, Kumaun; *Makur*, Hind., is a glabrous shrub of the arid and northern dry region from Sind to Oudh. The flower-buds are eaten as a vegetable, and a rope is made of the fibre. *Hemidesmus indicus*, R. Br. (*Asclepias Pseudo-sarsa*, Roxb. Fl. Ind. ii. 39.) Vern. *Anantamul*, Beng., is a climber whose roots are used as a substitute for sarsaparilla. There are also numerous small climbers of other genera found in the Indian forests, but none sufficiently large to be worth mention.

## ORDER LXXI. LOGANIACEÆ.

Contains 4 Indian genera, *Buddleia*, *Fagraea*, *Strychnos* and *Gardneria*. *Gaertnera*, Beddome clxiv, contains only Ceylon plants. *Gardneria ovata*, Wall.; Kurz ii. 227; Gamble 57. Vern. *Banjahi*, Kumaun; *Takpadik*, Lepcha, is a climber of the North-East Himalaya and Eastern Bengal. Kurz has divided this Order among several neighbouring ones, placing *Strychnos* in Apocynæ; *Fagraea* in Gentianæ; *Buddleia* in Pedalînæ; and *Gardneria* in Solanæ; we have, however, considered it better to follow Bentham and Hooker, and retain the Order, although the diverse structure of the wood of the different genera would seem to accord with Kurz's views.

The structure of *Strychnos* and *Fagraea* is similar in having scattered, large, ramified pores (intercellular ducts?) and small pores in concentric bands or irregular patches; and very sharply marked medullary rays in the firmer tissue intervening between the irregular patches. The structure of *Buddleia* is altogether different.

### 1. BUDDLEIA, Linn.

Contains 4 or 5 species. *B. macrostachya*, Bth., is a shrub of the Himalaya from Simla eastwards, the Khasia Hills and Sylhet.

Wood soft or moderately hard, no heartwood. Annual rings distinctly marked by a belt of numerous pores, the pores in the outer wood being often arranged in groups or concentric lines.

ome clxiii; Brandis 318; Kurz ii. 250;  
Fl. Ind. i. 396. Vern. *Bhati, dhanla*,  
*Newarpati*, Nep.; *Pondam*, Lepcha;  
*gmee koo*,

grey, moderately  
sely-packed pores  
scanty except

000 ft., Bengal,  
village sites and

Growth fast,  $4\frac{1}{2}$  rings per inch of radius Weight, 41 lbs per cubic foot It has white, long, tomentose leaves and long spikes of fragrant white flowers It is very ornamental and is often grown in gardens

H 110 Satej Valley, Simla, 4,000 feet

lbs  
44

2. *B. paniculata*, Wall ; Brandis 318 , Kurz n 251, Gamble 56  
*B. crispa*, Bth Vern *Spera wuna*, Afg , *Ihollu*, *ghúttia*, *sodhera*,  
*sudhari*, North-Western Himalaya, *Sinna*, Nep.

A large evergreen shrub. Bark thin, light grey, peeling off in long strips Wood white, moderately hard, close-grained Annual rings marked by a belt of small pores Pores in the autumn wood very small, in groups and in oblique lines Medullary rays fine

Himalaya, from the Indus to Bhutan ascending to 7,000 ft

Growth moderate, 11 rings per inch of radius Weight, 41 lbs per cubic foot

H 158 Simla, 7,000 ft

lbs  
41

H 2882 Naglanda, Simla, 7,000 feet

3. *B. Colvillei*, Hook f and Th , Gamble 56 Vein *Puri singhatti*,  
Nep., *Pya-shing*, Bhutan

A small tree Wood reddish brown, soft. Pores of two sizes large near the annual rings, smaller in the autumn wood, these latter grouped, the groups being enclosed in patches of soft tissue, which are arranged in interrupted concentric bands Medullary rays fine

$P = 1 = 0.000$  to  $0.000$  feet

per cubic foot An  
rich appear in August  
of Mount Tonglo

E 2393 Tonglo, Darjeeling, 10 000 feet

lbs.  
35

## 2 FAGRÆA, Thunb

Contains about 6 species *F. coromandelina* Wight, Beddome t 244 Vein  
*Ginnuna* Kan is a small handsome flowered tree of the Eastern Ghats of South  
India *F. auricularia*, Jack and *F. carnosa*, Jack, Kurz n 204, are large shrubs of  
Tenasserim

1. *F. fragrans*, Roxb Fl Ind i 461, Kurz n 205 Vein *Anan*,  
Burm

An evergreen tree Wood hard, brown, close-grained, beautifully  
mottled Pores of two classes, large ones scanty, often subdivided,  
small ones in narrow, wavy, concentric bands, which alternate with broader  
bands of firm and dark-coloured tissue in which the numerous fine medul-  
lary rays are distinctly visible The large pores (vessels or intercellular  
ducts) are prominent on a vertical section

Burma

Weight according to Baker 70 lbs , Wallich 52.5 lbs , Simpson, 57 lbs., Major  
Sexton 60 lbs , our specimens vary from 53 to 65 lbs Baler's four experiments  
with Tavoy wood with bars  $7 \times 2' \times 2$  gave  $P = 553$ , Simpson's gave 397, but  
the wood was a bad specimen The wood is very durable and is not liable to the  
attacks of *Teredo* It is one of the most important of the reserved trees of Burma

dry and 343 lbs. when wet, while common hemp only withstood 158 and 190 lbs. Royle says that a rope ( $1\frac{1}{2}$  inch) broke with 903 lbs., strong European rope breaking with 1,203 lbs. *M. Roylei*, Wight; Brandis 333. Vern. *Pathor*, Chenab; *Tar, veri*, Salt Range; *Kurang*, Simla (H 3194. Naldehra, Simla, 6,000 feet, with a white porous wood and annual rings marked by large pores), and *M. lucida*, Edgew.; Brandis 333. Vern. *Dudhi*, Kumaun, are small climbers of the North-West Himalaya. *Pergularia* contains 2 species: *P. pallida*, W. and A.; Brandis 334; Kurz ii. 202. Vern. *Surkila*, Kumaun, of Northern India; and *P. odoratissima*, Linn.; Brandis 334; Kurz ii. 203; Gamble 56. Vern. *Kanja lita, kunjalt*, Beng.; *Simpletbuk*, Lepcha, of Bengal, Burma and the North-West Himalaya as far as the Jumna, often cultivated.

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Wood soft or moderately hard, no heartwood. Annual rings distinctly marked by a belt of numerous pores, the pores in the outer wood being smaller and often arranged in groups or concentric lines.

1. *B. asiatica*, Lour.; Beddome clxiii; Brandis 318; Kurz ii. 250; Gamble 56. *B. Neemda*, Roxb. Fl. Ind. i. 396. Vern. *Bhati, dhaula, shiúntra*, Kumaun; *Bana*, Simla; *Newarpati*, Nep.; *Pondám*, Lepcha; *Nimda, budhbola*, Chittagong; *Kyoungmee koo*, Burm.

A large evergreen shrub. Bark thin, grey. Wood grey, moderately hard. Annual rings distinctly marked by a belt of closely-packed pores in the spring wood. Pores small, not all of equal size, scanty except along the annual rings. Medullary rays fine, numerous.

Sub-Himalayan tract from the Indus eastwards, ascending to 4,000 ft., Bengal, Burma, South India; chiefly found in second growth forests, deserted village sites and savannahs.

Growth fast 4½ rings per inch of radius Weight 44 lbs per cubic foot It has white, long tomentose leaves and long spikes of fragrant white flowers It is very ornamental and is often grown in gardens

H 110 Sutlej Valley, Simla, 4 000 feet

lbs  
44

2. *B. paniculata*, Wall , Brandis 318 , Kurz n 251, Gamble 56  
*B. crispa*, Bth Vern *Spera wuna*, Afg , *Dholu, ghúttia, sodhera, sudhari*, North-Western Himalaya , *Sinna*, Nep

A large evergreen shrub Bark thin, light grey, peeling off in long strips Wood white, moderately hard, close grained Annual rings marked by a belt of small pores Pores in the autumn wood very small, in groups and in oblique lines Medullary rays fine

Himalaya, from the Indus to Bhutan ascending to 7 000 ft

Growth moderate, 11 rings per inch of radius Weight, 41 lbs per cubic foot

H 158 Simla 7 000 ft

lbs  
41

H 2382 Naghanda, Simla, 7,000 feet

3 *B. Colvillei*, Hook f and Th , Gamble 56 Vern *Puri singhatti*, Nep , *Pya-shing*, Bhutia

A small tree Wood reddish brown, soft Pores of two sizes large near the annual rings, smaller in the autumn wood, these latter grouped, the groups being enclosed in patches of soft tissue, which are arranged in interrupted concentric bands Medullary rays fine

Eastern Himalaya 9 000 to 12 000 feet

Growth slow, 13 rings per inch of radius Weight 35 lbs per cubic foot An extremely handsome tree with masses of dark crimson flowers, which appear in August and make the tree very conspicuous in its habitat on the summit of Mount Tonglo

E 2393 Tonglo, Darjeeling 10 000 feet

lbs  
35

## 2 FAGRÆA, Thunb

Contains about 6

Gunnuna Kan

India *F. auriculari*

Tenasserim

cin  
uth  
of

1. *F. fragrans*, Roxb Fl Ind 1 461, Kurz n 205 Vern *Anan*, Burm

An evergreen tree Wood hard, brown, close-grained, beautifully mottled Pores of two classes, large ones scanty, often subdivided, small ones in narrow band with broader fine medullary ducts, all prominent on a vertical section

Burma

Weight according to Baker 70 lbs Wallich 52½ lbs , Simpson, 57 lbs , Maju Seaton 60 lbs , our specimens vary from 53 to 65 lbs Baker's four experiments with Tavy wood with bars 7 × 2 × 2 gave P = 553, Simpson's gave 387, but the wood was a bad specimen The wood is very durable, and is not liable to the attacks of *Teredo* It is one of the most important of the reserved trees of Burma

especially in Tavoy; and is used for house-building, bridge and wharf piles, boat-anchors and other purposes.

B 289.	Burma (1867)	.	.	.	.	.	.	.	lbs..
B 550.	Martaban	.	.	.	.	.	.	.	53
B 3073.	Burma (1862)	.	.	.	.	.	.	.	65
									57

## 2. *F. racemosa*, Jack; Kurz ii. 205. Vern. *Thit-hpaloo*, Burm.

A moderate-sized evergreen tree. Wood moderately hard, greasy to the touch and with a scent like that of India-rubber. Pores of two sizes: moderate-sized pores scattered, often oval and subdivided, and extremely small pores in narrow, wavy, concentric bands, alternating with broader bands of firmer tissue, in which the fine, numerous medullary rays are distinctly visible.

Andaman Islands.

Weight, 50 lbs. per cubic foot. Major Ford says it is strong and durable, that the wood is used for house-posts, and the root bark as a cure for fever.

B 1990.	Andamans (Kurz, 1866)	.	.	.	.	.	.	lbs.
B 2294.	„ (Ford, 1866)	.	.	.	.	.	.	52
								48

3. E 1450. (56 lbs) brought by Dr. Griffith from the Mishmi Hills in 1836. has the structure of *Fagraea*. It is probably *F. obovata*, Wall.; Beddome clxiv; Kurz ii. 205; Gamble 56. Vern. *Sunakhari*, Nep.; *Longsoma*, Magh; *Nvoungekyap*, Burman evergreen tree, often scandent or stem clasping, found in the forests of Northern and Eastern Bengal, Chittagong and Burma.

## 3. STRYCHNOS, Linn.

Contains 6 to 8 species of Indian trees or climbing shrubs. *S. Wallichiana*, Steud.; Kurz ii. 167, is an evergreen tree of the forests of the Pegu Yomah. *S. cinna-momifolia*, Thw. and *S. colubrina*, Linn.; Beddome clxiii are gigantic climbers of the Western Ghâts, while *S. laurina*, Wall. and *S. acuminata*, Wall.; Kurz ii. 166, are large evergreen climbers of Tenasserim, the latter also occurring on the coasts of South Andaman.

1. *S. potatorum*, Linn. fil.; Roxb. Fl. Ind. i. 576; Beddome clxiii; Brandis 317; Kurz ii. 167. The Clearing Nut Tree. Vern. *Nirmali*, *nel mal*, Hind.; *Kotaku*, Uriya; *Ustumri*, Gondi; *Tettancottai*, *tettian*, Tam.; *Chilla*, *indupa*, *induga*, *katakamu*, *judapa*, Tel.; *Nirmali*, *chilbinj*, Mar.; *Ustumri*, Gondi; *Tettam-parel*, Mal.; *Chillu*, Kan.; *Ingin*, Singh.

A moderate-sized evergreen tree. Bark  $\frac{1}{10}$ th inch thick, greyish brown and sometimes almost black, with numerous small angular, exfoliating scales. Wood white when fresh cut, turning yellowish grey on exposure, hard, close-grained, seasons well. No heartwood, no annual rings. Pores of two classes: large pores scanty, very small pores numerous, arranged in irregularly ramified patches, which are extremely variable in shape, giving the wood a remarkably fantastic pattern on a cross section. These patches are joined by white concentric lines which may possibly be annual rings. Medullary rays white, fine and moderately broad, numerous, sharply defined in the darker tissue. The large pores, which are prominent on a radial section, are filled with a white shining substance and are often ramified. They are probably not vessels, but large intercellular ducts.



1. *CORDIA*, Linn.

Contains 13 Indian species. *C. Wallichii*, G. Don; Beddome t. 245. Vern. *Chandle*, Kan., is a tree of the Western Ghâts, Mysore and Bombay, with woolly leaves. *C. grandis*, Roxb.; Kurz ii. 208; Gamble 57; Roxb. Fl. Ind. i. 593. Vern. *Asari*, Nep.; *Thanat*, Burm.; is an evergreen tree of Northern and Eastern Bengal and Chittagong. *C. octandra*, DC.; Beddome clxvi. (*C. serrata*, Roxb. Fl. Ind. i. 591.) Vern. *Gadgondori*, Hind., is a small tree of Travancore. *C. monoica*, Roxb. Fl. Ind. i. 592; Beddome clxvi. Vern. *Pida*, Hind.; *Panugeri*, Tel., is a small poor-looking tree of the barren parts of the Circar forests. *C. polygama*, Roxb. Fl. Ind. i. 594; Beddome clxvi.; Kurz ii. 207. Vern. *Bottukuru*, *patcha*, Tel., is a small tree of the mountains on the Coromandel Coast and the Eng forests of Martaban. *C. Perottetii*, DC.; and *C. fulvosa*, Wight, are small trees of the Western Ghâts. The above are white-flowered species. *C. subcordata*, Lamk.; Kurz ii. 209 (*C. campanulata*, Roxb. Fl. Ind. i. 593) is a handsome large shrub of the Andamans and Tenasserim, with red flowers, often cultivated. *C. speciosa*, Willd., and *C. tectonifolia*, Wall., are small trees with handsome scarlet flowers, cultivated in gardens, but introduced from the West Indies.

Numerous concentric lines of soft tissue, which sometimes are interrupted, but generally with the medullary rays divide the wood into oblongs or squares. Medullary rays prominent on a radial section.

1. *C. Myxa*, Linn.; Roxb. Fl. Ind. i. 590; Beddome clxv.; Brandis 336; Kurz ii. 208; Gamble 57. Vern. *Lasora*, *bhokar*, *gondi*, Hind.; *Laswara*, Pb.; *Lesûri*, *gidûri*, Sind; *Borla*, *baurala*, Kumaun; *Bohari*, *buhai*, Beng.; *Boeri*, Nep.; *Nimat*, Lepcha; *Dobakari*, Mechi; *Gondi*, *Uriya*; *Vidi*, *verasu*, Tam.; *Pedda boku*, *virgi*, *nakkeru*, *irki*, *iriki*, Tel.; *Semar*, *goden*, *gondan*, Mar.; *Chotte*, Kaa.; *Selte*, *Gondi*; *Silu*, Kurku; *Lasséri*, Baigas; *Lohû*, Cingh.; *Chaine*, Magh; *Thanat*, *toung thanat*, Burm.

A moderate-sized deciduous tree. Bark  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick, grey or brown, rough with shallow longitudinal wrinkles and furrows. Wood grey, moderately hard. Pores of two sizes, a few moderate-sized or large, uniformly scattered and frequently double, the rest very small in narrow continuous concentric belts of soft tissue. Medullary rays alternately fine and broad, the rays with the white concentric lines dividing the wood into marked squares or oblong compartments. Medullary rays prominent on a radial section as rough horizontal plates, having a mottled appearance.

Salt Range, Sub-Himalayan tract from the Chenab to Assam ascending to 5,000 feet, Khasia Hills, Bengal, Burma, Central and South India.

Growth moderately fast, 3 to 9 rings per inch of radius (Brandis); our specimens do not shew the rings well, with the exception of two, which give 1 to 2 rings per inch, which must be called very fast. The weight is very variable. Brandis in Burma List of 1862, No. 82, gives 33 lbs. per cubic foot; our specimens vary from 23 to 42 lbs., but the average is 33 lbs. Brandis in For. Fl., p. 337, says 33 to 49 lbs. The wood, in spite of its softness, is fairly strong, and seasons well, but is readily attacked by insects. It is used for boat-building, well-curbs, gun-stocks and agricultural implements, in Bengal for canoes. It might be tried for tea-boxes. It is an excellent fuel. The bark is made into ropes and the fibre is used for caulking boats. The leaves are used as plates and in Pegu to cover Burmese cheroots. The fruit (*Sebestan*) is eaten, it is very mucilaginous and is used in native medicine. The viscid pulp is used as birdlime. The kernel is eaten and is used for marking linen, but the mark is fugacious.

O 250.	Garhwal (1868)	lbs. 42
O 1376.	Gonda, Oudh	38
C 1149.	Ahiri Reserve, Central Provinces	37
E 642.	Rakti Forest, Darjeeling Terai	28

E 2391	Bamunpokri, Darjeeling Terai	11 1/2
E 714	Chittagong	28
B 2513	Burma (1862)	23
No 42	Salem Collection (marked <i>Spondias mangifera</i> )	36
		32

2 *C. Macleodii*, Hook f and Th , Brandis 337 Vern *Dhengan*, *dhaman*, *dhaian*, *dewan*, *daki*, *dahipalas*, *dihgan*, Hind , *Dhairuan*, *Sittari*, *Dauwas*, *dhaum*, *bhoti*, Mar , *Bot*, *Gondi*, *Lauri lassamái*, *Kurhu*, *Gadru*, Ajmere

A middling sized deciduous tree, with thick, grey, soft, corky bark. Heartwood light brown, beautifully mottled with darker veins, even-grained, very hard, strong, tough and elastic, seasons well and works easily. Pores small, in irregular concentric belts of white tissue, often joined by white lines without pores. Medullary rays white, fine and moderately broad, prominent.

specimens give 40 to 53 average 51 lbs  
and other ornamental work also for  
it deserves to be better known and more

in use

P 3219	Nagpahar Ajmere	lbs
C 180	Mandla Central Provinces (1870)	53
C 2985	Jubbulpore (1863)	50
C 831	Bairagarh Reserve Berar	40

3 *C. vestita*, Hook f and Th , Brandis 338 *Gynaion vestitum*, A DC Vern *Kumbi*, *karuk*, Pb , *Kum parman*, *pín*, *indak*, *chinta*, *ajunta*, *banula*, *berula*, Hind

A small deciduous tree. Bark 1/2 inch thick, dark grey, exfoliating when old in large woody scales. The wood has the same structure and appearance as that of *C. Macleodii*, except that the concentric lines are occasionally interrupted.

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O 231	Garhwal (1868)	11 1/2
O 2998	(1874)	52
O 3232	Dehra Dun	53

4 *C. fragrantissima*, Kunz n 207 Vern *Toungkalamet*, Burm

A deciduous tree. Wood moderately hard, reddish brown with darker streaks, beautifully mottled, has a fragrant scent. Pores small, in roundish patches, which are joined by fine, concentric lines. Medullary rays short, moderately broad, distinctly marked on a vertical section.

Burm  
Weig  
known  
to use

B 285	Burma (1867)	11 1/2
B 1428	Tharrawaddy, Burma	48
		51

5 *C. Rothii*, Rom and Schultes , Brandis 338 *C. angustifolia*, Roxb Fl Ind i 595 Vern *Gondi*, *gondni*, *gundi*, Hind , *Narvilli*, Tam



A small tree. Bark grey or brownish grey, with deep longitudinal furrows. Wood grey, compact, hard. Pores small, often subdivided. Medullary rays fine and moderate-sized. Numerous fine bands of softer tissue which on a transverse section divide the wood between the medullary rays into small squares.

Dry zones of North-West and South India.

Growth moderate, 10 rings per inch of radius. Weight, 42 to 52 lbs. per cubic foot (*Brandis*); our specimen gives 46 lbs. Used for fuel, in Sind for building, and in Cutch for agricultural implements. The bark when wounded gives a gum, and the liber is made into ropes. The pulp of the fruit is eaten.

P 449. Ajmere . . . . . lbs.  
46

## 2. *EHRETIA*, Linn.

Species about 8. *E. serrata*, Roxb. Fl. Ind. i. 596; *Brandis* 339; *Kurz* ii. 210; *Gamble* 57. Vern. *Pursan*, *kalthaan*, Pb.; *Pūnyan*, *pūnjlawāi*, *panden*, *koda*, *kūrkaā*, *arjūn*, Hind.; *Narra*, Garhwal; *Shaursi*, Kumann; *Rend*, Kurku; *Ridi*, Baigas; *Nalshuna*, *chillay*, Nep.; *Bual*, Ass.; *Kala-aja*, Beng., is a tree of the Sub-Himalayan tract from the Indus to Bhutan ascending to 5,000 feet, Eastern Bengal, and Chittagong. *Brandis* says "the wood is light brown, with white specks, fairly even and compact, soft, not heavy, easily worked, made into scabbards, sword-hilts, gun-stocks, and employed for building and agricultural implements." Aikin in *Wallich's* List of 1831 gives 3·3 rings per inch of radius for the rate of growth. *Kyd* gives for the weight, 37 lbs. per cubic foot, and  $P = 530$ . The fruit is eaten. *E. aspera*, Roxb. Fl. Ind. i. 598; *Beddome* clxvi. Vern. *Tella jūri*, Tel., is a small bushy tree of dry barren places in South India; as is also *E. buxifolia*, Roxb. Fl. Ind. i. 598; *Beddome* clxvi. Vern. *Bapana-būri*, Tel. *E. ovalifolia*, Wight; *Beddome* clxvi., is a small tree of Coimbatore, Madura and Tinnevely up to 2,000 feet, and *E. Wightiana*, Wall.; *Beddome* clxvi., a small tree of the Tinnevely Ghāts.

1. *E. lævis*, Roxb. Fl. Ind. i. 597; *Beddome* t. 246; *Brandis* 340; *Kurz* ii. 210. Vern. *Chamrūr*, *kōda*, *darar*, *datranga*, Hind.; *Tamboli*, Banda; *Mosonea*, Uriya; *Dotti*, *disti*, *gilchi*, Gondi; *Datranga*, Mar.; *Paldatam*, *redda pul-mera*, *seregal*, Tel.; *Kappura*, Kan.

A moderate-sized tree. Bark  $\frac{1}{2}$  inch thick, grey. Wood greyish white, hard. Annual rings indistinctly marked. Pores small, grouped in small clusters or radial lines. Medullary rays fine, short, numerous, distinctly visible on a radial section.

Suliman Range, Punjab, Sub-Himalayan tract, Oudh, Bengal, Burma and the Andaman Islands, Central and South India.

Growth moderate, 5 to 8 rings per inch of radius. Weight, 33 to 38 lbs. per cubic foot. Wood tough, durable, used for agricultural implements and building. The fruit is eaten, as is also the inner bark in times of famine.

O 257. Garhwal (1868) . . . . . lbs.  
C 1155. Ahiri Reserve, Central Provinces . . . . . 33  
38

2. *E. obtusifolia*, Hochstetter; *Brandis* 340.

A small shrub. Bark grey, thin. Wood resembling in structure that of *E. lævis*.

Salt Range in the Punjab, Sind and Rajputana.

P 3245. Ajmere.

3. *E. Wallichiana*, Hook. f. and Th.; *Gamble* 57. Vern. *Boeri*, *dowari*, Nep.; *Kalet*, Lepcha.

A large tree, sometimes gregarious. Wood grey, moderately hard. Annual rings marked by light-coloured belts. Pores small and moderate-

sized, in scattered groups and short radial lines. Medullary rays short, fine, uniform, distinctly marked on a radial section.

Darjeeling Forests from 2,000 to 7,000 feet.

Growth moderate, 7 rings per inch of radius. Weight, 33 lbs per cubic foot. The wood is used for building, for charcoal, and occasionally for making tea boxes.

E 690 Sepoydura Forest, Darjeeling, 5,500 feet. lbs. 33

## ORDER LXXIII CONVULVULACEÆ

Contains 7 genera of Indian shrubs or climbers, viz, *Erycibe*, *Ranea*, *Aigyrea*, *Tecoma*, *Passiflora*, *Ipomoea*, *Convolvulus*.

213

hill

"Elephant Creeper"

all, Kurz u  
but of very  
well known

## ORDER LXXIV SOLANÆÆ.

An Order of no special forest interest, though of considerable economic importance producing the potato, capsicum, tomato, tobacco, datura and Cape gooseberry. It contains 2 genera of Indian shrubs or small trees, *Lycium* and *Solanum*. *Lycium europæum*, Linn., Brandis 315. Vern *Ganger*, *langa churchitta*, *miral*, Pb., is a thorny shrub of the Punjab, Sind and Guzerat whose fruit is eaten. It is used as fuel, and the branches are made into wattled frames for the walls of huts. *Solanum* contains several shrubs, many of them occurring in waste places. The largest is perhaps, *S. terbasifolium*, Linn., Kurz u 225, Gamble 58. Vern *Dursul* Nep., *Sicor*, Lepcha, a small tree or large shrub of Northern and Eastern Bengal and Burma. It has a grey bark and light yellow soft wood with scanty, moderate sized often subdivided pores and numerous short medullary rays. The annual ring by a line of larger pores. (E 334 Kalmpong, Darjeeling, 4,000 f)

## ORDER LXXV. SCROPHULARINÆÆ.

Contains only very few genera of woody plants such as *Brandisia* and *Brandisia* contains two species one from Bhutan the other *B. discolor* Th., Kurz u 250 from the hill forests of Martaban at 2,000 to 3,000 feet.

The *Paulownia P. imperialis* Bth., a handsome flowered tree often for ornament, belongs to this Order.

### " 1 WIGHTIA, Wall

1. *W. gigantea*, Wall., Gamble 581. Vern *Lakoni*, Nep., *Bop*, Lepcha.

Bark grey, smooth, of unequal thickness, on the outside  $\frac{1}{2}$  inch thick, much thinner white, moderately distributed.

Hill forest 2,000 - 3,000 feet

A huge

aerial roots

pink flowers above the summit of the latter

The wood is used to make Buddhist idols, it is light and very soft, but does not warp. The stem is often 3 to 4 feet in girth.

E 3323 Rangum, Darjeeling 6,000 feet

in classing,  
masses of

A small tree. Bark grey or brownish grey, with deep longitudinal furrows. Wood grey, compact, hard. Pores small, often subdivided. Medullary rays fine and moderate-sized. Numerous fine bands of softer tissue which on a transverse section divide the wood between the medullary rays into small squares.

Dry zones of North-West and South India.

Growth moderate, 10 rings per inch of radius. Weight, 42 to 52 lbs. per cubic foot (*Brandis*); our specimen gives 46 lbs. Used for fuel, in Sind for building, and in Cutch for agricultural implements. The bark when wounded gives a gum, and the liber is made into ropes. The pulp of the fruit is eaten.

P 449. Ajmere . . . . .	lbs. 46
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## 2. EHRETIA, Linn.

Species about 8. *E. serrata*, Roxb. Fl. Ind. i. 596; Brandis 339; Kurz ii. 210; Gamble 57. Vern. *Pursan*, *kalthaun*, Pb.; *Púnryan*, *púnjlavdi*, *panden*, *koda*, *kírkúna*, *arjún*, Hind.; *Narra*, Garhwal; *Shaursi*, Kumaun; *Rend*, Kurku; *Ridi*, Baigas; *Nalshuna*, *chillay*, Nep.; *Bual*, Ass.; *Kala-aja*, Beng., is a tree of the Sub-Himalayan tract from the Indus to Bhutan ascending to 5,000 feet, Eastern Bengal, and Chittagong. Brandis says "the wood is light brown, with white specks, fairly even and compact, soft, not heavy, easily worked, made into scabbards, sword-hilts, gun-stocks, and employed for building and agricultural implements." Aikin in Wallich's List of 1831 gives 3·3 rings per inch of radius for the rate of growth. Kyd gives for the weight, 37 lbs. per cubic foot, and  $P = 530$ . The fruit is eaten. *E. aspera*, Roxb. Fl. Ind. i. 598; Beddome clxvi. Vern. *Tella jívi*, Tel., is a small bushy tree of dry barren places in South India; as is also *E. brevifolia*, Roxb. Fl. Ind. i. 598; Beddome clxvi. Vern. *Bapana-búri*, Tel. *E. ovalifolia*, Wight; Beddome clxvi., is a small tree of Coimbatore, Madura and Tinnevely up to 2,000 feet, and *E. Wightiana*, Wall.; Beddome clxvi., a small tree of the Tinnevely Gháts.

1. *E. lævis*, Roxb. Fl. Ind. i. 597; Beddome t. 246; Brandis 340; Kurz ii. 210. Vern. *Chamrúr*, *kóda*, *darar*, *datranga*, Hind.; *Tamboli*, Banda; *Mosonea*, Uriya; *Dotti*, *disti*, *gilchi*, Gondi; *Datranga*, Mar.; *Paldatam*, *redda pul-mera*, *seregad*, Tel.; *Kappura*, Kan.

A moderate-sized tree. Bark  $\frac{1}{2}$  inch thick, grey. Wood greyish white, hard. Annual rings indistinctly marked. Pores small, grouped in small clusters or radial lines. Medullary rays fine, short, numerous, distinctly visible on a radial section.

Suliman Range, Punjab, Sub-Himalayan tract, Oudh, Bengal, Burma and the Andaman Islands, Central and South India.

Growth moderate, 5 to 8 rings per inch of radius. Weight, 33 to 38 lbs. per cubic foot. Wood tough, durable, used for agricultural implements and building. The fruit is eaten, as is also the inner bark in times of famine.

O 257. Garhwal (1868) . . . . .	lbs. 33
C 1155. Ahiri Reserve, Central Provinces . . . . .	38

2. *E. obtusifolia*, Hochstetter; Brandis 340.

A small shrub. Bark grey, thin. Wood resembling in structure that of *E. lævis*.

Salt Range in the Punjab, Sind and Rajputana.

P 3245. Ajmere.

3. *E. Wallichiana*, Hook. f. and Th.; Gamble 57. Vern. *Boeri*, *dowari*, Nep.; *Kalet*, Lepcha.

A large tree, sometimes gregarious. Wood grey, moderately hard. Annual rings marked by light-coloured belts. Pores small and moderate-

sized, in scattered groups and short radial lines. Medullary rays short, fine, uniform, distinctly marked on a radial section.

Darjeeling Forests, from 2 000 to 7 000 feet.

Growth moderate. 7 rings per inch of radius. Weight, 33 lbs per cubic foot. The wood is used for building, for charcoal, and occasionally for making tea boxes.

E 690. Sepoydura Forest, Darjeeling, 5,500 feet

lbs  
33

### ORDER LXXIII. CONVULVULACEÆ

Contains 7 genera of Indian shrubs or climbers, viz, *Erycibe*, *Rivea*, *Argyria*, *Lettsomia*, *Ipomœa*, *Porana* and *Neuropeltis*.

With few exceptions such as the erect-growing *Erycibe glomerata*, Wall, Kurz II 213 of Tenasserim, they are all large climbers often with showy flowers, but of very little forest interest. *Argyria speciosa*, Sweet, Brandis 313, is the well known "Elephant Creeper."

### ORDER LXXIV. SOLANÆÆ.

An Order of no special forest interest, though of considerable economic importance producing the potato, capsicum, tomato, tobacco, datura and Cape gooseberry. It contains 2 genera of Indian shrubs or small trees *Lycium* and *Solanum*. *Lycium europæum*, Linn, Brandis 345. Vein Ganger, *kangu chichitta nirai*, Pb, is a thorny shrub of the Punjab Hind and Guziat whose fruit is eaten. It is used as fuel, and the branches are made into wattled frames for the walls of huts. *Solanum* contains several shrubs, many of them occurring in waste places. The largest is *S. elaeagnifolium*, Vern. D. re. 1. Nan.

### ORDER LXXV. SCROPHULARINÆÆ.

Contains only very few genera of woody plants, such as *Brandisia* and *Wightia*. *Brandisia* contains two species, one from Bhutan the other *B. discolor* Hook. f. and Th., Kurz II 250, from the hill forests of Martaban at 2,000 to 3,000 feet elevation.

The *Paulownia P. imperialis*, Bth, a handsome flowered tree often cultivated for ornament, belongs to this Order.

#### 1. WIGHTIA, Wall

1. *W. gigantea*, Wall, Gamble 581. Vern. *Lakori*, Nep., *Bop*, Lepcha.

Bark grey, smooth, of unequal thickness, on the outside  $\frac{1}{2}$  inch thick, much thinner where it touches the white, moderately soft, porous distributed. Medullary rays moderate.

is clasping,  
masses of

it does not

E 3323 Rungm, Darjeeling 6,000 feet

## ORDER LXXVI. GESNERACEÆ.

An Order scarcely worth mentioning, as it contains but one shrubby plant, the rest being mostly handsome-flowered, herbaceous plants of the damp zones.

## 1. LEPTOBŒA, Bth.

1. *L. multiflora*, Bth.; Gamble 58. *Championia multiflora*, C. B. Clarke. Vern. *Tungrangmook*, Lepcha.

A small shrub. Bark grey, peeling off in papery lakes. Wood yellowish white, hard, close and even-grained. Pores very small but distinct, in short radial lines. Annual rings marked by closer pores. Medullary rays extremely fine.

Hills of N. E. Himalaya up to 3,000 feet.

E 3314. Pankabari, Darjeeling, 2,000 feet.

## ORDER LXXVII. BIGNONIACEÆ.

Contains 8 genera of Indian trees, belonging to 2 tribes, viz.,—

Tribe I.—Bignoniæ	.	.	.	.	.	<i>Millingtonia</i> and <i>Oroxylum</i> .
„ II.—Tecomæ	.	.	.	.	.	<i>Tecoma</i> , <i>Dolichandrone</i> , <i>Heterophragma</i> , <i>Stereospermum</i> , and <i>Pajanelia</i> .

*Mayodendron igneum*, Kurz Prel. Report of Pegu, Appendix D; Burma For. Fl. ii. 233, is a handsome tree with scarlet flowers found in the Martaban Hills up to 2,000 feet.

To this family belong *Amphicome arguta*, Royle, a herb with large perennial root-stock, found on rocks in the North-West Himalaya; the Catalpa, *C. bignonioides*, an American tree with a greyish, handsomely-marked, very durable wood, often planted in Europe and now largely cultivated in America, and said to be good for sleepers; and numerous other large American trees with fine timber.

With few exceptions, this Order is characterised by irregular concentric bands of soft texture. The pores are moderate-sized and frequently filled with resin, and the medullary rays fine, the distance between the rays being generally equal to the transverse diameter of the pores.

## 1. MILLINGTONIA, Linn. fil.

1. *M. hortensis*, Linn.; Beddome t. 249; Brandis 347; Kurz ii. 238. *Bignonia suberosa*, Roxb. Fl. Ind. iii. 111. The Indian Cork Tree. Vern. *Nimi chambeli*, *akas-nim*, Hind.; *Aykayet*, Burm.; *Kât malli*, Tam.

A large tree. Wood soft, yellowish white. Pores small, numerous. Medullary rays fine, the distance between the rays somewhat larger than the transverse diameter of the pores. The specimen from the Saharanpur gardens shews distinct annual rings marked by more numerous and larger pores in the spring wood.

Cultivated in avenues and gardens in most parts of India, believed to be indigenous in Burma and the Malay Archipelago. Kurz says it is rather rare in the tropical forests from Martaban down to Tenasserim.

Weight 42 lbs per cubic foot (Skinner No 27) P=610 Our specimen gives 40lbs Growth fast 4 to 5 rings per inch of radius as far as we can judge from our young specimen

O 3160 Saharanpur Gardens

lbs  
40

## 2 OROXYLUM, Vent.

1. *O indicum*, Bth, Kurz ii, 237 *Calosanthus indica* Bl, Brandis 347, Gamble 59 *Bignonia indica*, Roxb Fl Ind iii 110, Beddome cxxvii Vern *Mulin*, *mirianga*, *sori tatpalang*, *tatmorang*, Pb *Ullu*, *arlu*, *kharkath*, *pharkath*, *sa ina*, *assar sauna*, *shjona*, Hind, *Tattunia*, C P, *Totilla*, *karamlanda*, Nep, *Kering*, Garo, *Cheipong*, Mechi, *So-long* Rajbanshi, *Pompo ia*, *Uija*, *Pana*, *vanga*, *acki*, Tam, *Pamania*, *pampana*, *dundillim*, *donllup*, Tel, *Dhatte*, Gondi, *Tetu*, Mar, *Totilla*, Singh, *Kyoungyabeng*, Burm, *Baladah*, And

A small tree Bark  $\frac{1}{4}$  in h thick, light brownish grey, soft, yields a green juice when cut Wood yellowish white, soft, no heartwood Pores moderate-sized, uniformly distributed Annual rings marked by more numerous pores Medullary rays fine to moderately broad, prominent on a radial section

to 3500 feet Bengal

1  
1  
between two layers of wickerwork to make umbrellas they may be seen in Buddhist temples in Sikkim hung up in strings or made into ornaments to suspend from the roof The tree is remarkable for its long flat sword like capsule and large dull coloured flowers Mr Manson says that the ground up bark mixed with 'hardi' is used to cure sore backs in horses

lbs per cubic foot The  
used to line hats and

P 111 Sutlej Valley

C 1179 Ahiri Reserve Central Provinces

E 582 Khookloong Forest Darjeeling Terai

E 2396 Bamunpokri Darjeeling Forest

lbs

27

32

31

## 3 TECOMA, Juss.

1 *T undulata*, G Don, Brandis 552 *Bignonia undulata*, Roxb Fl Ind iii 101 Vern *Reodana*, *reddan*, Trans Indus, *Lakura*, *luar*, *roir*, *rahira*, Pb, *Lohuri*, *lohéro*, Sind, *Roura*, *Mhurwarra*, *Rakht reora*, Mar

An evergreen shrub or small tree Bark  $\frac{1}{4}$  inch thick, corky, reddish brown Heartwood greyish or yellowish brown, close grained, mottled with lighter streaks, takes a fine polish Pores small and moderate-sized, often subdivided, enclosed in small rounded patches, which are frequently arranged in concentric lines Medullary rays short, fine and moderately broad, very prominent on a radial section as long, smooth plates

The wood is  
for furniture  
large and very

handsome

P 943 Salt Range Punjab

lbs  
64

## 4. DOLICHANDRONE, Fenzl.

Contains 5 Indian trees. *D. arcuata*, Hook. f. and Bth. Gen. Plant. ii. 1046 (*Spathodea arcuata*, Wight; Beddome clxix.) Vern. *Ran-palai*, Tam.; *Mersinghi*, Mar., is a tree of the Palghat and Coimbatore forests. *D. crispa*, Seem. (*Spathodea crispa*, Wall.; Beddome clxviii.; Brandis 350. *Bignonia crispa*, Buch.; Roxb. Fl. Ind. iii. 103) Vern. *Pumbadri*, Tam., is a handsome, white-flowered tree of South India, especially Cud-dapah and North Arcot, and probably the Central Provinces.

*D. falcata* and *D. Rheedii* have white, soft wood, without heartwood. Medullary rays very fine. Concentric bands of soft tissue very numerous. *D. stipulata* has hard, orange-coloured heartwood, and no concentric bands.

1. *D. stipulata*, Seem.; Bth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea stipulata*, Wall.; Kurz ii. 234. *Bignonia stipulata*, Roxb. Fl. Ind. iii. 108. Vern. *Petthan, malwa*, Burm.

A moderate-sized deciduous tree. Heartwood orange-red, beautifully mottled, hard, close-grained. Pores numerous, small, enclosed in round patches of soft tissue which are often arranged in wavy, concentric lines. Medullary rays prominent, very fine, very numerous, generally filled with a yellow substance.

Burma and Andaman Islands.

Weight, Brandis' Burma List, 1862, No. 77, gives 48 lbs.; Skinner, No. 26, gives weight 64 lbs., P = 1386; our specimens give 56 lbs. per cubic foot. Wood used for bows, spear handles, oars and paddles. Major Ford says it is a durable wood for house-posts and makes good furniture. Flowers orange-yellow.

B 2541.	Burma (1862)	. . . . .	lbs.
B 2261.	Andaman Islands (1866)	. . . . .	58
			54

2. *D. falcata*, Seem.; Benth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea falcata*, Wall.; Beddome t. 71; Brandis 350. *Bignonia spathacea*, Roxb. Fl. Ind. iii. 103. Vern. *Háwar*, Oudh; *Kanséri*, Meywar; *Mendal, manchingi*, Banswara; *Mersingi*, Mar.; *Udda, wodi*, Tel.; *Mersingh*, Bhíl; *Karanjelo*, Kurku; *Nir pongilam*, Mal.

A small deciduous tree. Bark  $\frac{1}{2}$  inch thick, bluish grey, exfoliating in irregular woody scales. Wood whitish, hard, close and even-grained, seasons well, shining and glossy; no heartwood. Annual rings indistinct. Pores small, oval and subdivided, arranged in wavy, narrow, concentric bands. Medullary rays very fine, very numerous.

Oudh, Rajputana, Central and South India.

Growth moderate, 7 to 8 rings per inch of radius. Weight, 42 to 43 lbs. per cubic foot. Wood used for building and agricultural purposes. Flowers white, leaves small.

C 1139.	Ahri Reserve, Central Provinces	. . . . .	lbs.
W 995.	Sahyádrí Gháts, Ahmednagar	. . . . .	42
			43

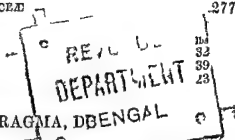
3. *D. Rheedii*, Seem.; Bth. and Hook. f. Gen. Pl. ii. 1046. *Spathodea Rheedii*, Wall.; Beddome clxviii.; Kurz ii. 234. Vern. *Deyadanga*, Cingh.; *Thakootma*, Burm.

Wood white, soft. Structure similar to that of *D. falcata*, but medullary rays very prominent on a vertical section.

Burma, Malabar, Ceylon and the Andamans.

Growth moderate, 7 to 13 rings per inch of radius. Weight, 23 lbs. (Adrian Mendis); our specimens give 32 to 39 lbs.; Brandis' Burma List, 1862, No. 79, gives 35 lbs. Flowers white.

- \* B 2015 Burma (1862)  
 B 2202 Andaman Islands (1866)  
 No 18 Ceylon Collection



## 5 HETEROPHRAGMA, DBENGAL

Wood soft, no heartwood Pores moderate sized. Medullary rays fine, the distance between the rays being equal to the transverse diameter of the pores No distinct concentric bands

1 *H. Roxburghii*, DC, Beddome clxix *Spathodea Roxburghii*, Sprengel, Brandis 350 *Bignonia quadrilocularis*, Roxb Fl Ind m 107 Vern *Baro kala goru*, Tam, *Bondgu*, Tel, *Pullung*, *varias*, Mar

A large tree Bark  $\frac{1}{2}$  inch thick, dark brown, exfoliating in small angular scales Wood grey rough, moderately hard No heartwood, no annual rings Pores moderate sized, uniformly distributed Medullary rays fine, visible on a radial section as long narrow plates

Chanda District Godavari Forests and Western Coast

Growth moderate 7 rings per inch of radius Weight 40 lbs per cubic foot Flowers rose coloured

C 1106 Ahiri Reserve Central Provinces

lbs  
40

2 *H. adenophylla*, Seem, Bth and Hool f Gen Pl n 1047, Kurz n 236 Vern *Pettthan*, Burm

A moderate sized deciduous tree Wood yellowish white moderately hard Pores moderate sized, often subdivided, uniformly distributed Medullary rays fine, numerous

Burma and Andaman Islands

Weight 41 lbs per cubic foot Flowers large dull brown

B 1421 Tharrawaddy Burma

lbs  
42

3 *H. sulfurea*, Kurz n 235 Vern *Thillinda*, Burm

A deciduous tree Wood dark grey, soft, even grained, in structure resembling that of *H. Roxburghii*

Burma chiefly in Promedistrict

Brandis Burma Lst 1862 No 78 gives weight 63 lbs the specimen now weighs 42 lbs Flowers yellow

B 2047 Burma (1862)

lbs  
42

## 6 STEREOSPERMUM, Chamisso

Contains 5 to 6 species, *S. amœnum* Benth and Hook f (*Spathodea amœna*

A DC Brandis 349

from the Mauritius but

Kurz n 230 Vern *Ti*

Pegu Yoma the wood

little used

Wood rough Heartwood small, brown, sometimes wanting Pores moderate sized, often joined by concentric bands or lines of soft texture, which are sometimes interrupted Medullary rays fine, the distance between the rays equal to the transverse diameter of the pores



## 4. DOLICHANDRONE, Fenzl.

Contains 5 Indian trees. *D. arcuata*, Hook. f. and Bth. Gen. Plant. ii. 1046 (*Spathodea arcuata*, Wight; Beddome clxix.) Vern. *Ran-palai*, Tam.; *Mersinghi*, Mar., is a tree of the Palghát and Coimbatore forests. *D. crispa*, Seem. (*Spathodea crispa*, Wall.; Beddome clxviii.; Brandis 350. *Bignonia crispa*, Buch.; Roxb. Fl. Ind. iii. 103) Vern. *Pumbadri*, Tam., is a handsome, white-flowered tree of South India, especially Cud-dapah and North Arcot, and probably the Central Provinces.

*D. falcata* and *D. Rheedii* have white, soft wood, without heartwood. Medullary rays very fine. Concentric bands of soft tissue very numerous. *D. stipulata* has hard, orange-coloured heartwood, and no concentric bands.

1. *D. stipulata*, Seem.; Bth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea stipulata*, Wall.; Kurz ii. 234. *Bignonia stipulata*, Roxb. Fl. Ind. iii. 108. Vern. *Petthan, malwa*, Burm.

A moderate-sized deciduous tree. Heartwood orange-red, beautifully mottled, hard, close-grained. Pores numerous, small, enclosed in round patches of soft tissue which are often arranged in wavy, concentric lines. Medullary rays prominent, very fine, very numerous, generally filled with a yellow substance.

Burma and Andaman Islands.

Weight, Brandis' Burma List, 1862, No. 77, gives 48 lbs.; Skinner, No. 26, gives weight 64 lbs., P = 1386; our specimens give 56 lbs. per cubic foot. Wood used for bows, spear handles, oars and paddles. Major Ford says it is a durable wood for house-posts and makes good furniture. Flowers orange-yellow.

B 2544.	Burma (1862)								lbs.
B 2261.	Andaman Islands (1866)	.	.	.	.	.	.	.	58
									54

2. *D. falcata*, Seem.; Benth. and Hook. f. Gen. Plant. ii. 1046. *Spathodea falcata*, Wall.; Beddome t. 71; Brandis 350. *Bignonia spathacea*, Roxb. Fl. Ind. iii. 103. Vern. *Háwar*, Oudh; *Kanséri*, Meywar; *Mendal, manehingi*, Banswara; *Mersinghi*, Mar.; *Udda, wodi*, Tel.; *Mersingh*, Bhíl; *Karanjelo*, Kurku; *Nir pongilam*, Mal.

A small deciduous tree. Bark  $\frac{1}{2}$  inch thick, bluish grey, exfoliating in irregular woody scales. Wood whitish, hard, close and even-grained, seasons well, shining and glossy; no heartwood. Annual rings indistinct. Pores small, oval and subdivided, arranged in wavy, narrow, concentric bands. Medullary rays very fine, very numerous.

Oudh, Rajputana, Central and South India.

Growth moderate, 7 to 8 rings per inch of radius. Weight, 42 to 43 lbs. per cubic foot. Wood used for building and agricultural purposes. Flowers white, leaves small.

C 1139.	Ahiri Reserve, Central Provinces							lbs.
W 995.	Sahyádrí Gháts, Ahmednagar	.	.	.	.	.	.	42
								43

3. *D. Rheedii*, Seem.; Bth. and Hook. f. Gen. Pl. ii. 1046. *Spathodea Rheedii*, Wall.; Beddome clxviii.; Kurz ii. 234. Vern. *Deyadanga*, Cingh.; *Thakootma*, Burm.

Wood white, soft. Structure similar to that of *D. falcata*, but medullary rays very prominent on a vertical section.

Burma, Malabar, Ceylon and the Andamans.

Growth moderate, 7 to 13 rings per inch of radius. Weight, 23 lbs. (Adrian Mendis); our specimens give 32 to 39 lbs.; Brandis' Burma List, 1862, No. 79, gives 35 lbs. Flowers white.

- \* B 2545 Burma (1862)  
 B 2252 Andaman Islands (1866)  
 No 18 Ceylon Collection

REVUE  
 DE  
 DÉPARTEMENT

## 5 HETEROPHRAGMA, DEENGAL

Wood soft, no heartwood Pores moderate sized. Medullary rays fine, the distance between the rays being equal to the transverse diameter of the pores No distinct concentric bands

1 11 11 11 11, Beddome elix *Spathodea Roxburghii*,  
*monia quadrilocularis*, Roxb Fl Ind in  
 Tam, Bondgu, Tel, Pullung, varias,

Mar

A large tree Bark  $\frac{1}{2}$  inch thick, bark brown, exfoliating in small angular scales Wood grey, rough, moderately hard No heartwood, no annual rings Pores moderate sized, uniformly distributed Medullary rays fine, visible on a radial section as long narrow plates

Chanda District Godavari Forests and Western Coast

Growth moderate 7 rings per inch of radius Weight 40 lbs per cubic foot  
 Flowers rose coloured

C 1106 Ahiri Reserve Central Provinces

lbs  
 40

2 *H adenophylla*, Seem, Bth and Hool f Gen Pl II 1047,  
 Kurz II 236 Vein *Pettan*, Burm

A moderate sized deciduous tree Wood yellowish white, moderately hard Pores moderate sized, often subdivided, uniformly distributed Medullary rays fine, numerous

Burma and Andaman Islands

Weight 41 lbs per cubic foot Flowers large dull brown

B 1431 Thairawaddy Burma

lbs  
 42

3 *H sulfurea*, Kurz II 235 Vein *Thitinda*, Burm

A deciduous tree Wood dark grey, soft, even grained, in structure resembling that of *H Roxburghii*

Burma chiefly in Prome District

Brandis Burma List 1862 No 78 gives weight 63 lbs the specimen now weighs 42 lbs Flowers yellow

B 2047 Burma (1862)

lbs  
 42

## 6 STEREOSPERMUM, Chamisso

Contains 5 to 6 species *S amœnum* Benth and Hook f

A DC B and 349 *Rader nachera amœna*  
 from the Mauritius but wild in Ava it is

Kurz II 230 Vern *Thanday* with pale l lac

Pegu Yoma the wood weighs 33 to 36 lbs and is reddish brown close grained but little used

Wood rough Heartwood small, brown, sometimes wanting Pores moderate sized, often joined by concentric bands or lines of soft texture, which are sometimes interrupted Medullary rays fine, the distance between the rays equal to the transverse diameter of the pores

Weight, 44 lbs. per cubic foot (*Brandis*); our specimens give 46 lbs. The wood is fairly durable, and easy to work; it is much valued for building and makes excellent charcoal. The root and bark are used in native medicine.

O 213	Garhwal (1868)	lbs
O 341	Gorakhpur (1868)	41
O 197	Mandla Central Provinces (1869)	49
C 1114	Ahri Réserve, Central Provinces	40
C 2745	Moharli "	46
C 832	Bairagarh Réserve, Berar "	50
E 1959	Chittagong	
B 307	Burma (1867)	51
		44

3. *S. xylocarpum*, Bth and Hook f Gen Pl n 1047 *Spathodea xylocarpa*, l And , Brandis 349 *Bignonia xylocarpa*, Roxb Fl Ind. iii 108, Beddome t 70 Vern *Kharsing*, *bersinge*, Mar , *Jai mangal*, *sondar-padal*, Mandla; *Dhōta mara*, *dhōtte*, Gondī, *Telo*, Kuku, *Tadencarn*, Tam , *Ghansing*, Kan

A deciduous tree. Bark  $\frac{1}{2}$  inch thick, light grey. Sapwood large, grey, heartwood very hard, brown. Annual rings marked by an irregular belt of numerous pores. Pores small and moderate sized, often subdivided, each pore or group of pores in a small patch of soft tissue, these patches are frequently grouped in zig zag and more or less concentric lines. In the heartwood the pores are generally filled with a yellow substance. Medullary rays short, fine.

Satpura Range, Khandeish and South India

Growth moderate 7 to 8 rings per inch of radius. Weight, 47 lbs per cubic foot. Wood tough and elastic, close grained, used for cabinet work.

C 2310	Melghat, Berar (sapwood)	lbs
C 958	Guzerat	36
W 996	Sabyadri Ghāts Ahmednagar	47
		47

4. *S. fimbriatum*, DC , Kurz n 231 Vern *Thanthat*, Burm

A deciduous tree. Heartwood small, dark brown. Sapwood light brown. Wood very hard in structure similar to that of *S. suaveolens*.

Martaban and Tenasserim in Burma

Weight, 54 lbs per cubic foot

B 2696	Tavoy (Wallich 1828)	lbs
		54

Nos E 719 (52 lbs) from Chittagong, D 1284 (54 lbs) from the Anamalai Hills, B 2355 (52 lbs) and B 2234 (56 lbs) from the Andamans probably belong to this genus.

Wood rough, yellowish grey, moderately hard, with a small heartwood, in structure resembling *S. suaveolens*.

## 7 PAJANELIA, DC.

1. *P. multijuga*, DC , Kurz n 237 Vern *Kyoungdouk*, *lingatun*, Burm , *Kaukonda*, And.

A large evergreen tree. Bark  $\frac{1}{2}$  inch thick. Wood orange brown, very hard, close grained. P filled with yellow resin, each pore surrounded by tissue, uniformly distributed. Medullary r. rough,

*Lantana alba*, Miller; Brandis 369; Kurz ii. 253 (*L. dubia*, Roxb. Fl. Ind. ii. 89) is a shrub of the Punjab, Sind, the North-West Sub-Himalayan tract up to 3,000 feet, the Dekkan and South India.

*Holmskioldia sanguinea*, Retz; Brandis 370; Kurz ii. 256; Gamble 62. (*Hastingia coccinea*, König; Roxb. Fl. Ind. iii. 65.) Vern. *Kub-tolia*, Kumaun; *Sarputtia*, Nep.; *Sivettachim*, Lepcha, is a large straggling shrub with showy scarlet flowers in a scarlet membranous calyx, common in the outer Himalaya from the Sutlej to Assam up to 3,000 feet, and in the Prome district of Burma.

*Glossocarya mollis*, Wall.; Kurz ii. 257, is a shrub of Tenasserim. *Hymenopyramis brachiata*, Wall.; Kurz ii. 258, is an evergreen climber of the Prome forests.

*Symphorema* contains 2 climbers of South India: *S. polyandrum*, Wight, from near Madras, and *S. involucriatum*, Roxb. Fl. Ind. ii. 262; Kurz ii. 254. Vern. *Súrúdí*, Tel.; *Nwaysat*, Burm., of the forests of the Coromandel Coast and Burma. *Sphenodesma* contains 5 species, among which *S. Wallichiana*, Schauer (*Symphorema pentandrum*, Kurz ii. 255) is a climber of Eastern Bengal and Tenasserim; and *S. unguiculata*, Schauer (*Symphorema unguiculatum*, Kurz ii. 255.) Vern. *Ka-nway*, Burm., is a climber of Burma and the Andaman Islands. *Congea tomentosa*, Roxb.; Kurz ii. 256. Vern. *Tha-ma-ka-nway*, Burm., is a large climbing shrub of South India, Chittagong and Burma, with beautiful pink, lilac or white bracted flowers.

With the exception of teak, the trees of this Order have no dark-coloured heartwood. The annual rings are generally well marked. The pores are small or moderate-sized, rarely large. Medullary rays generally fine and equidistant. The wood of *Avicennia* is anomalous.

## 1. CALLICARPA, Linn.

Contains about 7 species. *C. macrophylla*, Vahl.; Roxb. Fl. Ind. i. 393 (also *C. incana*, Roxb.) Brandis 368; Kurz ii. 274. Vern. *Pattharman*, *bá-pattra*, *baunu*, Jhelum; *Sámáli*, Chenab; *Denthar*, *drüss*, Ravi; *Daya*, *shiwalí*, Kumaun; *Mathara*, *mattranja*, Beng., is a tall shrub of Northern India, found as far north as Hazara, and up to 6,000 feet. *C. lanata*, Linn.; Beddome clxxiii; Roxb. Fl. Ind. i. 391, is a tree of the hills of Western and South India. *C. rubella*, Ldl.; Kurz ii. 274; Gamble 60. Vern. *Sugroomook*, Lepcha, is a small tree of the North-East Himalaya and the hills of Martaban. *C. longifolia*, Lamk.; Kurz ii. 275, is a shrub of Eastern Bengal and Burma.

1. *C. arborea*, Roxb. Fl. Ind. i. 390; Brandis 368; Kurz ii. 274; Gamble 60. Vern. *Ghiwala*, *dera*, *shiwalí*, Kumaun; *Bormala*, Beng.; *Goehlo*, Nep.; *Kodo*, *kozo*, Mechi; *Súng-a*, Lepcha; *Doika*, Rajbanshi; *Khoja*, Ass.; *Makanchi*, Gáro; *Turmong*, Magh; *Doung-sap-pya*, Burm.

A moderate-sized tree with brownish, rough grey bark. Wood grey, moderately hard, even-grained. Annual rings visible. Pores small to large, oval and often elongated, subdivided into numerous compartments, often in radial lines. Medullary rays broad, short, with numerous fine rays between them, well marked on a radial section; the distance between the rays greater than the transverse diameter of the pores.

Kumaun, Oudh, Eastern Bengal and Burma; chiefly in second-growth forest.

Growth fast, 5 rings per inch of radius. Weight, our specimens give 32 to 35 lbs. per cubic foot; Kyd gives only 22 to 25, but there was probably some mistake. The wood is not used except for charcoal.

	lbs.
E 597. Khookloong Forest, Darjeeling Terai . . . . .	32
E 2397. } Bamunpokri, Darjeeling Terai . . . . .	35
E 2398. }	

2 *C. cana*, Linn , Gamble 60

A shrub Bark thin, grey brown Wood white, soft Annual rings marked by a line of close pores Pores moderate sized, sometimes subdivided Medullary rays moderately broad, the distance between them greater than the transverse diameter of the pores

Bengal

Common in forests and along roadsides in the Terai and Duars extending probably southwards to the Ganges It has pretty pink flowers

E 3276 Damah Reserve W Duars

## 2 TECTONA, Linn fil

1 *T. grandis*, Linn fil , Roxb Fl Ind 1 600, Beddome t 250, Brandis 354, Kurz n 259, Gamble 60 The Teak Tree Vern *Saj*, Arab , *Saj*, *sal*, Pers , *Sâgun*, Hind , *Singuru*, Uiyu, *Sag*, *saguar*, Mar , *Teka*, Gondi , *Sag*, Bhl , *Tekku*, *tek*, Tam , *Teku* Tel , *Jadi*, *sagwan*, *tega*, Kan , *Tekka*, Cingh , *Kyun*, Burm , *Jati*, Malay

A large deciduous tree Bark  $\frac{1}{2}$  inch thick, grey, fibrous, with shallow longitudinal wrinkles, peeling off in long thin flakes The sap wood is white and small, the heartwood when cut green has a pleasant and strong aromatic fragrance and a beautiful dark golden yellow colour, which on seasoning soon darkens into brown mottled with darker streaks The timber retains its fragrance to a great age, the characteristic odour being apparent whenever a fresh cut is made It is moderately hard, exceedingly durable and strong, does not split, crack, warp, shrink, or alter its shape when once seasoned, works easily and takes a good polish The annual rings are distinctly marked by larger and more numerous pores in the spring wood The pores are mostly single but sometimes subdivided, those of the inner layer of each annual ring are large, while those of the outer portion are moderate sized and small The medullary rays are short, moderately broad, equidistant, the distance between the rays about equal to the transverse diameter of the larger pores The pores are well marked on a longitudinal section, and the medullary rays give the wood a beautifully mottled appearance The pores are sometimes filled with a white substance The pith is large and quadrangular

The Teak tree is found in Central and South India and Burma Its northern

Annual rings.—It is now established beyond doubt that the concentric rings which are so marked in the wood of Teak correspond each to one year's growth The following statement exhibits the rings counted on sections of trees grown in the Nilambur plantations These sections were cut in 1877 and were taken from the base of the stem and with a few exceptions the number of rings agrees with the age of the tree  
 shews the gradual  
 exhibits the number  
 different ages  
 average of each y

They therefore exhibit a more rapid rate of growth than average specimens would do.

Year of plantation.	Number of rings counted.	Average diameter of section (wood only).	Average diameter of heartwood.	Rings per inch of average radius.
		Inches.	Inches.	
1844 . . . . .	33	20·8	19·3	3·17
1845 . . . . .	31	21·1	18·7	2·95
1846 . . . . .	31	20·	17·7	3·10
1847 . . . . .	30	23·8	21·5	2·52
1848 . . . . .	28	16·7	15·4	3·34
1849 . . . . .	28	18·1	16·2	3·09
1850 . . . . .	27	14·	12·5	3·85
1851 . . . . .	25	15·2	13·4	3·28
1852 . . . . .	32*	15·2	13·5	Omitted.
1853 . . . . .	24	15·1	12·	3·17
1854 . . . . .	24	17·3	15·2	2·77
1855 . . . . .	23	12·4	10·5	3·71
1856 . . . . .	21	15·2	12·6	2·76
1857 . . . . .	20	12·2	10·6	3·27
1858 . . . . .	19	14·	11·3	2·71
1859 . . . . .	18	14·	10·6	2·57
1860 . . . . .	17	12·9	10·4	2·63
1861 . . . . .	16	13·1	10·5	2·44
1862 . . . . .	15	11·7	9·	2·56
1863 . . . . .	14	13·6	10·4	2·06
1864 . . . . .	13	12·5	9·4	2·08
1865 . . . . .	12	9·4	6·9	2·55
1866 . . . . .	11	10·4	7·3	2·11
1867 . . . . .	10	11·8	8·3	1·69
1868 . . . . .	9	10·5	7·6	1·71
1869 . . . . .	8	7·4	4·8	2·16
1870 . . . . .	7	7·4	4·5	1·89
1871 . . . . .	7	7·7	4·3	1·81
1872 . . . . .	5	6·5	2·6	1·53
				Average 2·62 rings per inch of average radius.

\* There is evidently a mistake here. The tree which yielded this section must have been an older tree standing in the plantation of 1852.

The sections ranged in age from 5 to 33 years. Dividing them into three groups, two of 10 years each, and the third of 9 years, we obtain the following as the mean diameter in inches of these three groups:—

Mean diameter of trees	5—14 years old	Inches.
	15—24    "	9·72
	25—33    "	13·79
		18·71

Name of plantation.	Age.	Year of plantation.		Average	Average		Girth at	Rings per	Remarks.
Thongzal . . .	Years	1863	18	Inches.	Inches.	61	20	47	Burnt yearly.
Myodwin . . .	15	1863	15	64	46	65	17.5	48	Protected.
Kangyee . . .	13	1865	14	62	48	44	14	58	Burnt yearly.
Choungwah . . .	12	1866	12	48	30	46	16.5	41	Protected.
Ditto . . .	10	1865	10	58	40	42	14	40	Do.
Ditto . . .	8	1870	8	21	42	39	13.71	38	Do.
Quaymakeling . . .	11	1867	11	48	24	63	18.75	37	Do.
Ditto . . .	9	1869	9	59	35	49	13.6	41	Do.
Ditto (private) . . .	10	1869	10	44	26	53	23	36	Burnt yearly.
				75	52				

P.

Year of plantation	Number of rings counted	AVERAGE DIAMETER OF SECTION IN INCHES		Rings per inch of average radius
		Wood,	Heartwood	

## SOUTH KANARA (PARAPPA PLANTATION).

Not known . . .	10	9	49	222
Ditto . . .	5	55	25	181

## NORTH KANARA (KALANADI VALLEY).

Sulageri, 18 years old	18	8	6	45
	17	88	75	39
	17	9	7	37
Murdi, 12 years old	8	75	Heartwood not distinct.	21
	11	6		37
	11	57		38
Kadra, 10 years old	8	65		25
	8	75	5	21
	7	7	4	3

## BENGAL (BAMUNPOKET).

1868 . . . . .	8	65	25	25 measured 1877.
1871 . . . . .	6	6	1	2 " "
1872 . . . . .	4	5	1	1.6 " "

## ANDAMANS (PORT BLAIR).

1873 . . . . .	6*	101	6	12 " "
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## BURMA (TENASSERIM)

Shoaygoon, 1856 . . .	22	53	35	83 " 1878.
Koloon " . . .	23	46	3	96 " "
Thinganneenoung " . . .	21	76	45	55 " 1877.

\* The tree was probably older.



It will be noticed that as far as the data go, which are furnished by the sections received, South Kanara, North Kanara and Bamunpokri exhibit an increase of diameter similar to that of Nilambur; while in the samples from Burma the annual rings are much narrower and the specimen from Port Blair shewed an extremely rapid rate of growth.

*Girth and height at different ages.*—The following measurements illustrate the rate of growth of Teak in plantations in different provinces as nearly as possible from 5 to 5 years. The Nilambur plantation again furnishes the largest amount of information:—

Age.	Mean girth at breast high.	Total height of tree.
------	----------------------------	-----------------------

*Nilambur plantation.—Alluvial soil.*

3—7 years	12 inches . . . .	29 feet.
8—12 "	17 " . . . .	63 "
13—17 "	23 " . . . .	68 "
18—22 "	25 " . . . .	71 "
23—27 "	27 " . . . .	77 "
29 "	34 " . . . .	87 "
30 "	35 " . . . .	85 "
31 "	32 " . . . .	75 "
32 "	34 " . . . .	92 "
33 "	37 " . . . .	95 "

*Nilambur plantation.—Gneiss and laterite.*

7 years	13 inches . . . .	30 feet.
16 "	14 " . . . .	50 "
20 "	21 " . . . .	50 "
24—26 "	22 " . . . .	52 "
30 "	24 " . . . .	50 "

These figures are taken from that portion of Colonel Beddome's report (paragraphs 11—44) which contains his notes on each year's plantation, and the data recorded are stated to be average figures.

In another part of his report (paragraph 81), however, he gives data which would seem to shew that the average size of the trees in the older plantations (all on alluvial soil) is considerably greater. He there states the dimensions of the largest, smallest and medium sized trees in four plantations, the results being as follows:—

AGE.	MEAN GIRTH (PROBABLY BREAST HIGH).			LENGTH OF BOLE.		
	Largest.	Medium.	Smallest.	Largest.	Medium.	Smallest.
	Inches.	Inches.	Inches.	Feet.	Feet.	Feet.
30 years . . . .	67	47	29	79	65	50
31 " . . . .	69	49	30	80	65	50
32 " . . . .	63	46	30	83	67	50
33 " . . . .	68	56	43	86	68	50

The first three lines shew the average of 6 trees in each case, and the last line the average of 8 trees each. It is distinctly stated that the length is that of the bole, and not of the entire tree.

The plantations made on gneiss and laterite shew a much slower rate of growth than those on alluvial soil; the difference being considerable in height, and much less in girth.



Outside the range of the natural growth of teak, the following data, regarding its rate of growth, are available :—

Plantation.	Age, in years.	Mean girth, breast high, in inches.	Total height of tree, in feet.
Bamunpokri (Sikkim) . . . . .	5	5.5	12—15
Hoolingamara (Chittagong) . . . . .	5	11	20—25
Rampahar (Chittagong) 3 specimens . . . . .	4	6	10—15
Kulsi (Assam) . . . . .	7	17	20—30
Makum „ . . . . .	5	11	29
„ „ . . . . .	4	9	18
„ „ . . . . .	5	11	27
„ „ . . . . .	7	16	31

The growth at that early age is fairly good; but it does not follow from these figures that teak in Bengal and Assam will attain a great age, and produce good timber.

The following instances of older trees of known age in Assam and Bengal are on record :—

Locality.	Number of trees measured.	Age, in years.	Mean girth, in inches.
Gauhati, banks of the Brahmaputra . . . . .	15	37	85
Royal Botanical Gardens, Calcutta . . . . .	19	6	16
Ditto ditto . . . . .	8	70	79
Garden at Mohesh, Serampore . . . . .	27	50	52

The trees at Gauhati were on an average 30—50 feet high.

The trees in the Botanical Garden, Calcutta, were measured in January 1856. The older trees have since been blown down by the cyclones of 1864 and 1867.

On the banks of the Hooghly at Mohesh, below Serampore, stands a grove of teak trees planted in 1828. Their mean girth, breast high, taken by measuring 27 average-sized trees, was 52 inches. The trees were measured in January 1878, and were therefore 50 years old. They are from 40—50 feet high.

In paragraphs 177 and 183 of Dr. Schlich's report for 1872-73, the dimensions of a large number of Teak trees at different stations of Lower Bengal are given; but unfortunately no trustworthy information regarding their age is available.

*Cubic contents of trees at different ages.*—In paragraph 4 of Colonel Beddome's report a statement is given exhibiting the dimensions of the trees, sections of which were sent to the Paris Exhibition. As already stated, these trees were selected as samples of the dominant trees, *viz.*, of those which will eventually be selected to remain on the ground as the ultimate crop; but, with few exceptions, they were not selected from among the largest individuals which had much outrun their neighbours. Arranging them in groups from 10 to 10 years, the following results are obtained :—

Age.	Height of tree, in feet.	Girth at base, in inches.	Length of bole, in feet.	Mean cubic contents, in cubic feet.
4—13 years . . . . .	48—75	21—60	32—56	10.6
14—23 „ . . . . .	65—110	51—69	40—70	23.8
24—33 „ . . . . .	70—110	60—105	41—72	51.3

This gives us the cubic contents at different ages as follows —

Mean age	Cubic contents, in cubic feet	Periodical annual increment in cubic feet
9	10.6	1.1 to 9 years
19	23.8	1.3 from 9 to 19 years
29	51.3	2.8 from 19 to 29 years

The annual increment increases steadily to the age of 30 years and probably continues increasing for a considerable time beyond it.

*Number of trees and cubic contents of growing stock per acre*—Regarding the number of trees and the growing stock per acre at different ages we depend almost entirely upon Nilambur for our data. Sample areas of half an acre each were selected in each of seven plantations, each tree was measured the cubic contents determined, and the following is the result. It is not expressly stated, but it is probable, that these sample areas were all selected on alluvial soil\* —

					CUBICAL CON		AVERAGE AN NUAL INCRE		
Name and year of plantation									
					tree	acre	tree	acre	
Iravelly Kava	1844	33	120	59	97	41	4 879	1 2	148
Elanjerry	1845	32	158	61	79	30	4 742	9	148
	1846	31	156	60	74	27	4 204	9	136
Moolathamano	1847	30	140	62	75	27	3 713	9	124
	1848	29	156	60	68	21	3 243	7	112
Elanjerry	1858	19	270	45	50	8	2 203	4	116
Wallashary	1868	9	750	40	34	3	2 491	4	277

is 8 feet. On the other hand, 0 feet, and it is probable that per acre. On page 155 of the rests (loonzaleen) is described trees with clear stems to the

\* The length of stem to the top of sale measurement where the head begins of every tree in plantations of 1844 to 1848, both inclusive was measured by sending up a climber with a tape. In the plantations of 1859 and 1868 a large number of felled saplings were available of which the average was taken.

The mean quarter girth was determined in the following manner. Ten saplings were measured breast high and in the middle of the stem at half its length and this gave  $f$  as the reducing factor. Those trees 30 inches in girth breast high were found to have a girth of 25 inches in the middle of the bole.

first branch of 50 feet, the girth between 4' 6" and 6' 5"; this would give 91 trees to the acre. Full stocked forests of Oak and Beech in Europe 130—180 years old under favourable conditions contain 120—140 trees per acre, with a cubic contents (including tops and branches) of about 11,000 cubic feet. A forest of silver fir in the Jura, 180 years old, was found to contain 91 trees per acre, with a cubic contents of 16,000 feet.

The total area now stocked at Nilambur is 3,436 acres, of which 1,787 are stocked with a full crop on alluvial soil, the rest not being expected to yield a full crop. In his estimate of the future value of the plantations, Colonel Beddome only assumes 6,000 cubic feet as the full crop expected on alluvial soil.

Mr. Carter reports from Burma that at Magayee and Kyekpyoogan in each plantation the trees upon  $\frac{1}{2}$  acre were measured. A breadth of 24 feet and a length of 454 feet was given to this area, so as by extending over a greater portion of the plantation, to avoid the experiment being confined to a small spot on which the growth was particularly good. But this strip was not taken in a part of the plantation which contained many blanks, but rather in a part which was well stocked without choosing the very finest parts of the plantation. These measurements then do not profess to shew the exact state of the plantations, but to give data which are nearly normal. In the 1873 and 1872 plantations—after the deduction of the mean girth, 3 sample trees in each were felled and the contents calculated by sections, the length of which were taken at 2 feet. In the 1875, 1874, 1869 and 1870 plantations only one sample tree in each was cut; and in those of 1876 and 1871 no trees were cut, enough data being to hand as to the reducing factor to enable the contents of an average tree to be calculated without its being felled. In the 1871 plantation only were the heights and girths so divergent as to render the separation of the trees into two classes with a sample tree for each necessary. The plantation of 1868 at Kyekpyoogan is so poorly stocked and so badly grown that no measurements were taken as they would have been valueless for comparison.

The results, as might be expected from plantations with only an interval of one year, diverge very widely.

The plantations of 3 and 4 years shew an abnormally high annual increment; those of a 8, 9 and 10 years an abnormally low one, attributable to their increase for the last 3 years being almost nil, due most probably to fire and in part also to caterpillars consuming the first growth of leaves.

Name and year of plantation.		Age.	Number of trees per acre.	Average height.	Average girth at breast height.
		Years.		Feet.	Inches.
Magayee,	1876 . . .	3	1,059	10	6 (3—9)
	1875 . . .	4	1,048	22	8 (3—12)
	1874 . . .	5	952	10	6 (2—10)
	1873 . . .	6	1,084	18	8 (4—14)
	1872 . . .	7	1,100	26.6	10 (4—17)
Kyekpyoogan,	1871 . . .	8	876	20	8 $\frac{1}{2}$ (2—16)
	1870 . . .	9	800	30	9 $\frac{1}{2}$ (6—17)
	1869 . . .	10	848	30	10 (6—18)

In natural forests, where Teak is associated with bamboos and other trees, the number of first and second class Teak trees (above 4' 6" in girth) rarely attains 10

trees per acre over large areas The following are instances of forests exceptionally well stocked with Teak.—

Date of survey	Forest	Area.	NUMBER PER ACRE		Total
			CLASS		
			Girth above 6 feet.	Girth 4½ to 6 feet	
1876 .	Bumaram (Central Provinces)	50 acres .	4	43	83
1870 71 .	Pegu (Prome District) .	17 square miles	36	30	66

The weight and transverse strength have been determined by the following experiments —

Experiment by whom conducted	Year	Wood whence obtained	Weight	Number of experiments	Size of bar	Value of P
					Ft in in	
Wallich . . .		Ceylon	47			
" . . .		Travancore	42			
" . . .		Malabar	37			
" . . .		Moulmein	31.5			
A Mendis, No 85 .	1855	Ceylon	55		} 3 × 1 × 1 {	810
" No 86 .	"	Cochin	44			673
" No 87 .	"	Moulmein	42			640
Bennett, No 12 .	1872		42	3	3 × 1½ × 1½	747
French (Erode)	1861	South India .		1	1 × 1 × 1	457
Cunningham . .	1854	Vindhyan hills	44.5	1	2 × 1 × 1	953
Puckle . . .	1850	Mysore . . .	43	4	2 × 1 × 1	730
Couch (Plymouth)		India . . .	38.5	2		
Simpson . . .		} Thongyeen and Zimnee {	43.5	13	} 3 × 1½ × 1½ {	478
" . . .			42	4		660
" . . .			38	8		591
" . . .			39.5	5		631
Skinner, No 123 .	1862	Malabar	45		}	814
" . . .	"	Boulmeia . .	43			472
" . . .	"	Pegu . . .	37			809
Fowke . . .	1859	Nagpore . . .	41	4	} 2 × 1 × 1 {	738
Kyd . . .	1831	Burma . . .	39	1		472
Campbell . . .	1831	" (unseasoned)	47	4		663
" . . .	"	" . . .	43	2	} 6 × 2 × 2 {	814
" . . .	"	Java . . .	43	1		604
" . . .	"	Bombay . . .	41	2		923
" . . .	"	Malabar . . .	49	1	} 3 × 1½ × 1½ {	537
Matland . . .	1862	Burma . . .	41			468
Baker . . .	1829	Rangoon . .	43	5	6 × 2 × 2	589 to 830
" . . .	"	Bombay { Received at	43	6	" " "	628
" . . .	"	Pegu { Cosipore,	46	3	" " "	653
" . . .	"	Malabar { April 1825	45	3	" " "	602
" . . .	"	Burma { Received at Cos	43	3	5½ × 2 × 2	756
" . . .	"	Malabar { sipore, April	48.5	3	" " "	649
" . . .	"	Malabar { Received at Cos	46.5	2	" " "	683
" . . .	"	Bengal { sipore, April		12	3 × 1½ × 1	693
" . . .	"	Bengal . . .		14	2 × 1 × 1	666
" . . .	"	" very old, taken from				
" . . .	"	a Dutch house at Cossipore	41.5	6	7 × 2 × 2	731
" . . .	"	" . . .	40.5	6	1½ × 1 × 1	731
Russell . . .	1863	" . . .	41	3	" " "	828

Experiment by whom conducted.	Year.	Wood whence obtained.	Weight.	Number of experiment.	Size of bar.	Value of P.
					<div>Ft. in. in.</div>	
Brandis . . . . .	1862	Burma (No. 80) . . . . .	40 to 51	...	4 × 1 × 1	570 to 867
" . . . . .	1861	" . . . . .	40½	12	6 × 2 × 2	563
" . . . . .	"	" . . . . .	40	6	6 × 2 × 1½	577
" . . . . .	"	" } Half seasoned {	45	10	6 × 2 × 2	531
" . . . . .	"	"	43	9	6 × 2 × 1½	584
" . . . . .	"	"	46	20	6 × 2 × 2	599
" . . . . .	1863-66	" . . . . .	39	4	" " "	617
" . . . . .	"	" . . . . .	38	9	6 × 2 × 1½	670
" . . . . .	"	" . . . . .	40½	5	3 × 1 × 1	812
" . . . . .	"	" . . . . .	39	11	2 × 1 × 1	619
" . . . . .	"	" . . . . .	37	17	2 × 1 × ¾	612
Laslett, p. 125 . . . . .	1876	Moulmein, No. 1 . . . . .	45½	6	} 7 × 2 × 2 {	684
" . . . . .	"	" No. 2 . . . . .	50	6		637
" p. 126 . . . . .	"	" . . . . .	45½	6	.....	...
Dundas . . . . .	1877	Moulmein . . . . .	31	12	10 × 4 × 6	467
" . . . . .	"	" . . . . .	34	12	2 × 1 × 1	701
Warth . . . . .	1878	Central India . . . . .	43½	5	.....	...
" . . . . .	"	Malabar . . . . .	42	3	.....	...
" . . . . .	"	Burma . . . . .	40	4	.....	...

The weight may, therefore, for practical purposes, be taken approximately at 40 lbs. per cubic foot, and the value of P. at 600, on an average. Molesworth, however, in 'Graphic Diagrams for strength of teak beams' gives: Weight 45 lbs., P = 800, E = 5,000. Captain J. C. Dundas, V. C., R. E., in his report on experiments (see above) made at Lucknow in 1877 and 1878 (Roorkee Professional Papers April 1879, Vol. VIII, No. 32), in which he gives the weight at 34 lbs., P = 470 and E. = 2,200 as an average, says that logs as received at Lucknow shew a weight of nearly 50 lbs. per cubic foot, but that after being well dried and sawn into scantlings, the weight falls to 34 or 35 lbs. His value for P. is a reliable one, for it is based on experiments made with beams of the large size of 10 feet × 4 in. × 6 in.

Teak wood does not split, crack, warp or alter its shape when once seasoned, it does not suffer in contact with iron, and is rarely, if ever, attacked by white ants. Its durability is probably due to the aromatic oil contained in the wood.

It is the chief timber of India and Burma; it is exported largely for ship-building and the construction of railway carriages. In India it is used for all purposes of house and ship-building, for bridges, sleepers, furniture, and most other purposes.

The leaves give a red dye; they are very large and are used as plates, for packing and for thatching. The oil is extracted from the wood in Burma and is used medicinally, as a substitute for linseed oil and as a varnish.

					lbs.
C 1408.	Jagmandal Reserve, Central Provinces . . . . .				...
C 1409.	Ahiri Reserve, Central Provinces . . . . .				38
C 2933.	Sonawani, Satpura Reserve, Central Provinces . . . . .				...
	(Tree planted in 1867, cut down in 1876, 10-inch girth.)				
C 2983.	(White Teak, <i>Dudhia Sagun</i> )	Jubbulpore, Central			41
C 2982.	(Black " <i>Telia Sagun</i> or oil teak)	Provinces, 1863.			48
C 2987.	(Stone " <i>Pattharee Sagun</i> .)				44

(Black Teak is rather darker coloured, but otherwise there is no difference in structure, and very little in appearance between these three specimens.)

					lbs.
C 834.	Bairagarh Reserve, Berar . . . . .				46
C 2809.	Melghát, Berar (sapwood) . . . . .				38
E 1202.	Bamunpokri Plantation, Darjeeling Terai, Bengal . . . . .				...
Specimens from compartment	I. 1 planted 1868 . . . . .				...
"	" " II. 1 " 1871 . . . . .				...
"	" " I. 1 " " . . . . .				...
"	" " I. 3 b " 1872 . . . . .				...

E 3290-291	Hoolingamara Block, Sitapabar Plantations, Chittagong, 1873 and 1875		
E 3386-88	Rampabar Block, Sitapabar Plantation Chittagong 1873		
W 1216	North Kanara Plantation Bombay		
	Specimen from	{ Suligeri, 18 years old	
		{ Murdi 12 , ,	
		{ Kadra 10 " ,	
W 1217	North Kanara Bombay		lbs 39
W 730	South Kanara, Madras		46
W 753			43
W 1206	Parappa 'leak' Plantation, South Kanara, Madras Saplings of 5 and 10 years growth		
W 2959.	Nilambur Plantation Malabar Specimens cut by Mr		
W 1203			
B 2551	Burma (1862)		44
B 801	Pegu		40
B 1385	Thinganneenoung Plantation Martaban		34
	Tree 54 feet high, 30 feet to first branch planted in 1856		
B 2709	Tavoy (Wallich, 1828)		42
B 1346	Andaman Islands		
	Tree planted at Dhunee Valley, Leaf Creek Port Blair, in 1873 Height 44 feet girth at 5 feet, 36 inches, at 21½ feet, 17 inches, at 28½ feet, 10 inches		
No 85	Ceylon Collection (Ceylon wood)		lbs 44
" 86	" " (Cochin wood)		40
" 87	" " (Moulmein wood)		41
" 47	Salem Collection		40

## 2. *T. Hamiltoniana*, Wall, Kurz n 259 Vein *Tanap*, Burm

A deciduous tree Wood light brown, hard, close grained Pores small Medullary rays fine, the distance between them equal to the transverse diameter of the pores Annual rings marked by a continuous line of somewhat larger pores

Prome district and Upper Burma

Growth moderate 9 to 10 rings per inch of radius Weight, 64 lbs per cubic foot.  
A good wood, and likely to be useful

B 3126	Prome, Burma	lbs 64
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## 3. *PREMNA*, Linn

Contains about 20 to 25 species of Indian trees shrubs or climbers Besides those here described, most of the species are small shrubs climbers, or at most small trees, chiefly of South India and Burma *P. barbata*, Wall, Brandis 367, Gamble 61, Vern *Ganhila*, Pb, *Lammar* Hind, *Michapnol*, Lepcha, is a small tree of the North East Himalaya and Sub Himalayan tract *P. viburnoides* is a small deciduous tree of the forests of Arracan and Tenas n 263, Gamble 61 Eastern Bengal and climber of the forests the structure of a climber the distance between Darjeeling 7,000 feet)



Experiment by whom conducted.	Year.	Wood whence obtained.	Weight.	Number of experiment.	Size of bar.	Value of P.
					Ft. in. in.	
Brandis . . . . .	1862	Burma (No. 86) . . . . .	40 to 51	...	1 × 1 × 1	570 to 867
" . . . . .	1861	" . . . . .	40.5	12	6 × 2 × 2	564
" . . . . .	"	" . . . . .	40	6	6 × 2 × 1½	574
" . . . . .	"	" } Half seasoned {	45	10	6 × 2 × 2	537
" . . . . .	"	" }	43	9	6 × 2 × 1½	584
" . . . . .	"	" }	46	20	6 × 2 × 2	593
" . . . . .	1865-66	" . . . . .	39	4	" × " × 1½	617
" . . . . .	"	" . . . . .	39	9	6 × 2 × 1½	670
" . . . . .	"	" . . . . .	40.5	5	3 × 1 × 1	812
" . . . . .	"	" . . . . .	39	11	2 × 1 × 1	649
" . . . . .	"	" . . . . .	37	17	2 × 1 × 1	612
Laslett, p. 125 . . . . .	1875	Moulmein, No. 1 . . . . .	45.5	6	} 7 × 2 × 2 {	654
" p. 126 . . . . .	"	" No. 2 . . . . .	50	6		637
" . . . . .	"	" . . . . .	48.5	6	" . . . . .	"
Dundas . . . . .	1877	Moulmein . . . . .	34	12	10 × 4 × 6	467
" . . . . .	"	" . . . . .	34	12	2 × 1 × 1	701
Warth . . . . .	1878	Central India . . . . .	43.5	5	.....	...
" . . . . .	"	Malabar . . . . .	42	3	.....	...
" . . . . .	"	Burma . . . . .	19	4	.. ..	...

The weight may, therefore, for practical purposes, be taken approximately at 40 lbs. per cubic foot, and the value of P. at 600, on an average. Molesworth, however, in 'Graphic Diagrams for strength of teak beams' gives: Weight 45 lbs., P = 800, E = 5,000. Captain J. C. Dundas, V. C., R. E., in his report on experiments (see above) made at Lucknow in 1877 and 1878 (Roorkee Professional Papers April 1879, Vol. VIII, No. 32), in which he gives the weight at 34 lbs., P = 470 and E = 2,200 as an average, says that logs as received at Lucknow shew a weight of nearly 50 lbs. per cubic foot, but that after being well dried and sawn into scantlings, the weight falls to 34 or 35 lbs. His value for P. is a reliable one, for it is based on experiments made with beams of the large size of 10 feet × 4 in. × 6 in.

Teak wood does not split, crack, warp or alter its shape when once seasoned, it does not suffer in contact with iron, and is rarely, if ever, attacked by white ants. Its durability is probably due to the aromatic oil contained in the wood.

It is the chief timber of India and Burma; it is exported largely for ship-building and the construction of railway carriages. In India it is used for all purposes of house and ship-building, for bridges, sleepers, furniture, and most other purposes.

The leaves give a red dye; they are very large and are used as plates, for packing and for thatching. The oil is extracted from the wood in Burma and is used medicinally, as a substitute for linseed oil and as a varnish.

lbs.

C 1408.	Jagmandal Reserve, Central Provinces . . . . .	...
C 1409.	Ahiri Reserve, Central Provinces . . . . .	38
C 2933.	Sonawani, Satpura Reserve, Central Provinces . . . . .	...
	(Tree planted in 1867, cut down in 1876, 10-inch girth.)	
C 2983.	(White Teak, <i>Dudhia Sagun</i> )	
C 2982.	(Black " <i>Telia Sagun</i> or oil teak)	Jubbulpore, Central { 41
C 2987.	(Stone " <i>Pattharee Sagun</i> .)	Provinces, 1863. { 48
		44

(Black Teak is rather darker coloured, but otherwise there is no difference in structure, and very little in appearance between these three specimens.)

lbs.

C 834.	Bairagarh Reserve, Berar . . . . .	46
C 2809.	Melghát, Berar (sapwood) . . . . .	38
E 1202.	Bamunpokri Plantation, Darjeeling Terai, Bengal . . . . .	...
Specimens from compartment I. 1	planted 1868 . . . . .	...
" " "	II. 1 " 1871 . . . . .	...
" " "	I. 1 " " . . . . .	...
" " "	I. 3 b " 1872 . . . . .	...

E 3290-291	Hoolingamara Block, Sitapahar Plantations, Chittagong, 1873 and 1875	
E 3386-88	Rampahar Block, Sitapahar Plantation Chittagong, 1873	
W 1216	North Kanara Plantation, Bombay	
	Specimen from	
	{ Sulageri 18 years old	
	{ Murda 12 " "	
	{ Kadra 10 " "	
W 1217	North Kanara Bombay	lbs 39
W 730	South Kanara, Madras	46
W 753		42
W 1206	Parappa Teak Plantation South Kanara Madras Saplings of 5 and 10 years growth	
W 2959	Nilambur Plantation Malabar Specimens cut by Mr Blandis in 1864, Nos 1 2 and 4 aged 5 10 and 20 years and measuring 16 19 and 25 inches in girth respectively	
W 1203	Nilambur Plantation Malabar Series, Nos 1 to 33 aged 33 years to 1 year respectively	
B 2551	Burma (1862)	44
B 801	Pegu	40
B 1385	Thinganneenoung Plantation, Martaban	34
B 2709	Tree 54 feet high 30 feet to first branch planted in 1856	
B 1346	Tavoy (Wallich, 1828)	42
	Andaman Islands	
	Tree planted at Dhunee Valley Leaf Creek Port Blair in 1873 Height 44 feet girth at 5 feet, 36 inches, at 21½ feet, 17 inches, at 28½ feet 10 inches	
No 85	Ceylon Collection (Ceylon wood)	lbs 44
" 86	" (Cochin wood)	40
" 87	" (Moulmein wood)	41
" 47	Salem Collection	40

2. *T. Hamiltoniana*, Wall., Kurz n. 259. Vorn Tanap, Buem

A deciduous tree. Wood light brown, hard, close grained. Pores small. Medullary rays fine, the distance between them equal to the transverse diameter of the pores. Annual rings marked by a continuous line of somewhat larger pores.

### Prome district and Upper Burma

Growth moderate 9 to 10 rings per inch of radius      Weight, 64 lbs per cubic foot.  
A good wood and likely to be useful

B 3126	Prome, Burma	lbs 61
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## 3 PREMNA, LIND

Contains about 20 to 25 species of Indian trees shrubs or climbers. Besides those here described most of the species are small shrubs climbers or at most small trees, chiefly of South India and Burma. *P. barbata*, Wall., Brandis 387, Gamble 61, V. = *Gambelii* Bl. = *V. ...* a small tree of the

is a small decid-  
vergreen small tree  
brandis 367, Kurz  
a climbing shrub of  
le 61, a common  
white wood with  
rad medullary rays,  
the pores (E 3395

The structure of the wood is similar to that of *Fiter* (p. 296), but rather lighter and softer.

1. *P. tomentosa*, Willd.; Roxb. Fl. Ind. iii. 76; Beddome t. 251; Brandis 367; Kurz 260. Vern. *Nagal*, *naoru*, *naura*, Tel.; *Chambara*, Mar.; *Ije*, Kan.; *Boosairu*, Cingh.; *Kyunnalin*, Burm.

A moderate-sized deciduous tree with grey bark similar to that of teak. Wood smooth, light brown, the colour of teak but lighter (hence the Burmese name), moderately hard, smooth, close and even grained, seasons well. Pores moderate-sized, sometimes small, sometimes subdivided, very numerous, uniformly distributed, except that they are a little more numerous near the inner edge of the annual rings, which are fairly well marked. Medullary rays numerous, short, moderately broad, very prominent on a radial section.

South India and Burma.

Growth rather fast, 4 to 8 rings per inch of radius. Weight: Brandis' Burma List, 1862, No. 85, gives 52 lbs.; our specimens vary from 40 to 54 lbs. per cubic foot. Brandis' four experiments in 1861 gave, with bars 3' × 1" × 1", Weight = 43 lbs., P. = 670. The wood polishes well, and is used for weaving shuttles in Burma. It would do for turning and fancy work.

	lbs.
B 317. Burma (1867)	54
B 2718. Tavoy (Wallich, 1828)	53
B 2548. Burma (1862)	51
B 1424. Burma	40

(Wood rough, grey, and lighter than the other specimens of *P. tomentosa*.)

2. *P. longifolia*, Roxb. Fl. Ind. iii. 79. *P. tomentosa*, Willd.; Gamble 61. Vern. *Gryheli*, Nep.; *Sungna*, Lepcha; *Dhaoli*, Mechi; *Gohora*, Ass.

An evergreen tree with thin white bark and indented stem. Wood greyish brown, hard, close-grained. Annual rings well marked by a belt of darker and firmer wood on the outer edge of each ring. Pores small, often subdivided. Medullary rays fine and moderately broad, wavy.

Eastern Sub-Himalayan tract of Bengal and Assam.

Growth fast, 3 to 5 rings per inch of radius. Weight, 47 to 50 lbs. per cubic foot. Wood used for house-posts in Assam.

	lbs.
E 2400. Sivoke, Darjeeling Terai	47
E 1267. Lakhimpur, Assam	50

3. *P. latifolia*, Roxb. Fl. Ind. iii. 76; Beddome clxxii.; Brandis 366; Gamble 61. Vern. *Gineri*, Nep.; *Michapong*, Lepcha; *Dauli*, Rajbanshi; *Pedda-nella-kura*, Tel.; *Gondhona*, Uriya; *Middi*, Cingh.

A small deciduous tree with greyish white bark. Wood grey with yellow, green, and purple streaks. Annual rings marked by a faint line. Pores between small and moderate-sized, often oval and subdivided. Medullary rays numerous, uniform, equidistant, moderately broad, marked on a radial section. Distinguished from *P. tomentosa* by softer wood, by the medullary rays being closer together, and by smaller pores.

Sub-Himalayan tract from Kumaun eastwards, South India.

Growth moderate, 4 to 9 rings per inch of radius. Weight 38 to 43 lbs. per cubic foot. Used to obtain fire by the hill tribes of Sikkim. The leaves are said by Beddome to be eaten in curries: they are sometimes given as fodder to cattle.

	lbs.
E 621. Rakti Forest, Darjeeling Terai	38
E 2399. Bamunpokri, " "	43

4. *P. integrifolia*, Linn , Brandis 366, Gamble 60 *P serratifolia*, Linn , Roxb Fl Ind iii 77, Beddome clxxii, Kurz ii 262 Vern *Bakucha*, Garhwal, Gannari, Oudh, *Bhut bhirai*, Beng , *Gineri*, Nep , *Munnay*, Tam., *Ghebu nelli*, *pinna-nelli*, Tel , *Chamari*, Mar , *Appel*, Mal

A small deciduous tree, the stem and branches often armed with stout woody spines. Wood white with purple streaks, moderately hard, close-grained, structure similar to that of *P latifolia*, from which it is probably not specifically distinct

Oudh Northern Bengal South India Ceylon Tenasserim and the Andaman Islands  
Weight 35 lbs per cu bic foot The wood is used for firewood the leaves for feeding cattle The fresh felled wood exudes a green coloured sap

O 3082 Gonda Oudh

O 3092 Kheri

lbs

35

5 *P mucronata*, Roxb Fl Ind iii 80, Brandis 366, Gamble 61, Vern *Bankhar*, *gian*, Pb , *Bakar*, *bakarcha*, *basolia*, *agnun*, *tumari*, *ghalela*, Hind , *Agnun*, Kummun

A small tree with grey bark. Wood moderately hard, light purple, structure the same as that of *P integrifolia*

Sub Himalayan tract from the Chenab eastwards. Wood a good fuel, used to obtain fire by friction

O 3091 Kheri Oudh

#### 4 GMEIINA, Linn.

Contains 3 species *G asiatica* Linn Roxb Fl Ind iii 87 Beddome clxxii, Brandis 365 Kurz ii 265 Vern *Gumudi* Tel is a large branching shrub or small tree of swamp forests in South India Burma and Ceylon *G Hystrix*, Schult, Kurz ii 265 is a large scandent shrub or Tenasserim

1 *G arborea*, Roxb Fl Ind iii 84, Beddome t 253, Brandis 364, Kurz ii 264, Gamble 61 Vern *Gumhar*, *hammara*, *kambhar*, *kumar*, *gambari*, *sewan*, *shewan*, Hind , *Gumar*, *gumbar*, Beng , *Gambari*, Nep , *Uriya*, *Gomari*, Ass , *Numbor*, Lepcha, *Gumai*, Cichar, *Bollobal*, Garo, *Gumadi*, *cummi*, Tam , *Gumar tek* *pellagomru*, *tagumuda*, *gumudu*, Tel , *Shewney*, *kuli*, Kan , *Shewan*, Mar , *Chimman*, *sag*, Bhil , *kumbulu*, Mal , *Kurse*, Gondi, *Kassamar*, *Kurku*, *At demirata*, Cingh , *Ramani*, Magh , *Iamaney*, Burm

A moderate sized or large deciduous tree. Bark  $\frac{1}{2}$  inch thick, smooth, white or whitish grey. Wood yellowish, greyish or reddish white, with a glossy lustre, close and even grained, soft, light and strong, durable, does not warp or crack. Annual rings marked either by a white line or by more numerous pores in the spring wood. Pores large and moderate sized, often subdivided, rather prominent on a vertical section. Medullary rays short, moderately broad, prominent, visible on a radial section as irregular horizontal bands, giving the wood a mottled appearance

Sub Himalayan tract from the Chenab eastwards and through all India Burma and the Andaman Islands

various a small form  
1 in (or 1 10) in (or  
.7 in) with a diameter

of 14 inches or nearly 4 rings per inch. The weight and transverse strength have been determined by the following experiments :—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar.	Value of P.
					Ft. In. In.	
Wallich . . . . .	...	India . . . . .	32	...	...	...
Kyd . . . . .	1831	Assam . . . . .	33	...	2 × 1 × 1	675
Baker . . . . .	1820	Bengal . . . . .	29	3	7 × 2 × 2	375
" . . . . .	"	" . . . . .	29	4	6 × 2 × 2	398
" . . . . .	"	Junagarh . . . . .	50? wet	4	7 × 2 × 2	324
Brandis, No. 87 . . . . .	1862	Burma . . . . .	35	...	...	...
Warth . . . . .	1878	as below . . . . .	36	18	...	...

The wood is easily worked and readily takes paint or varnish ; it is very durable under water. It is highly esteemed for planking, furniture, door panels, carriages and palanquins, well-work, boats, toys, packing cases and all ornamental work ; it is used in Burma for carving images, clogs and canoes. It would probably be a valuable wood for tea-boxes. It is the chief furniture wood of Chittagong and is in some demand in Calcutta. Writing in May 1829, in 'Gleanings in Science,' Captain Baker, the Superintendent of Suspension Chain Bridges, spoke of *Gumbhar* wood as "well calculated for light planking, panelling, blinds and venetians, and of much estimation for picture frames, organ pipes, sounding boards and other such work where shrinkage is to be avoided," so that it has evidently been long known in the Calcutta market. The fruit is eaten by Gonds, and, as well as the bark and root, is used in native medicine. It is now being planted at Sitapahar and Jamguri in Bengal, and, if not eaten down by deer who are very fond of it, it grows very fast. Seedlings in the Jamguri Nursery, Buxa Reserve, in 1879 reached a height of nearly 4 feet in 6 months.

									lbs.
O	325.	Garhwal (1868)	.	.	.	.	.	.	33
O	343.	Gorakhpur (1868)	.	.	.	.	.	.	32
O	1372.	Gonda, Oudh	.	.	.	.	.	.	40
O	1457.	Bahraich, Oudh	.	.	.	.	.	.	38
O	1483.	Kheri, Oudh	.	.	.	.	.	.	39
C	182.	Mandla, Central Provinces (1870)	.	.	.	.	.	.	35
C	1129.	Ahiri Reserve, Central Provinces	.	.	.	.	.	.	...
C	835.	Bairagarh Reserve, Berar	.	.	.	.	.	.	45
C	2775.	Melghát, Berar	.	.	.	.	.	.	38
C	959.	Guzerat, Bombay	.	.	.	.	.	.	34
E	676.	Bamunpokri, Darjeeling Terai	.	.	.	.	.	.	41
E	2396.	Sivoke Forest, "	.	.	.	.	.	.	35
E	948.	Eastern Dúars, Assam	.	.	.	.	.	.	36
E	2193.	Nowgong, Assam	.	.	.	.	.	.	39
E	2303.	Kámrúp, "	.	.	.	.	.	.	37
E	1435.	Assam	.	.	.	.	.	.	31
E	1390.	Chittagong	.	.	.	.	.	.	33
B	295.	Burma (1867)	.	.	.	.	.	.	28
B	1425.	Tharrawaddy, Burma	.	.	.	.	.	.	35

## 5. VITEX, Linn.

Contains 10 to 12 species of Indian trees. *V. trifolia*, Linn.; Roxb. Fl. Ind. iii. 69; Beddome clxxii.; Brandis 370; Gamble 61 (*V. Agnus-castus*, Linn.; Kurz ii. 269) Vern. *Nishinda*, Hind.; *Pajpati*, Nep.; *Nir-nochi*, Tam.; *Favili*, Tel.; *Karanuchi*, Kan., is a small tree or shrub of Bengal, South India and Burma. *V. heterophylla*, Roxb. Fl. Ind. iii. 75; Kurz ii. 270; Gamble 61. Vern. *Neri*, Nep.; *Murkut*, Lepcha, is a large tree of Northern and Eastern Bengal and Burma. *V. canescens*, and *V. limonifolia*, Kurz ii. 270, 271, are deciduous trees of the forests of Prome. *V. Wimberleyi*, Kurz ii. 271, is a small evergreen tree of the Andaman Islands.

Wood between 40 and 55 lbs in weight, hard, close grained Annual rings distinct Pores small or moderate sized Medullary rays fine, uniform, numerous, equidistant

1 *V. Negundo*, Linn , Roxb Fl Ind iii 70, Beddome clxxi Brandis 369 Vern *Marwai*, *moiaun*, *maua mora wana*, *banna*, *torban*, *biuna*, Pb , *Shiwari*, *shawali*, *nengai*, *mewai*, *nisi da*, Hind , *Beyguna*, *Uriya*, *Nirgunda*, *nirgur*, Mai , *Nigui* Gond : *Nigudi*, *Kuiku*, *Fella nuchi*, Tam , *Veyala*, Tel , *Lakki*, Kan *Silu nika*, Cingh

A deciduous shrub, with thin grey bark Wood greyish white, hard Annual rings marked by a narrow belt of more numerous and larger pores at the inner edge Pores small and moderate sized Medullary rays numerous fine, uniform, equidistant

Common in the drier parts of India and ascending to 5000 feet in the North West Himalaya

Growth moderate 7 rings per inch of radius Weight 41 to 42 lbs per cubic foot The branches are used for wattle work the root is employed as a febrifuge and the leaves to cure headache

H 3044 Kumharan Sitley Valley  
C 2789 Melghat Berar

lbs  
42  
41

2 *V. altissima*, Linn , Roxb Fl Ind iii 71, Beddome t 252, Brandis 370, Gamble 61 Vern *Akay*, Ass , *Maua*, Tam , *Myrole*, *balgay*, *nauladi*, *sampaga pala*, Kan , *Banalgay*, Mai , *Mitula*, Cingh

A large tree Bark  $\frac{1}{2}$  inch thick, grey, fibrous Wood grey with a tinge of olive brown, hard, close grained, polishes well Annual rings distinctly marked by a belt of firmer wood on the outer edge Pores small, scanty Medullary rays fine, numerous, wavy

Bengal South India and Ceylon

Growth moderate 8 to 9 rings per inch of radius Weight 50 to 53 lbs per cubic foot (South Kanara specimens) 49 and 50 lb  
Skinner No 145 gives 63 lbs for Kanara  
Skinner P = 557 Molesworth in Graphic gives Weight 50 lbs P = 722 E = 4700  
carls and deserves attention

W 724 South Kanara  
W 757

lbs  
53  
50

Nos 54 (56 lbs) and 78 (49 lbs) Ceylon Collection

3 *V. pubescens*, Vahl , Beddome clxxi , Kurz ii 271 *V. arborea*, Roxb Fl Ind iii 73 Vern *Nowli eragu*, *busi*, Tel , *Myaladi*, Tam , *Kyet yoh*, Burm

A large tree Wood smooth, grey with an olive-brown tinge, very hard, close-grained Annual rings marked by a more or less sharp line and by a broad belt of firmer wood on the outer edge Pores small, uniformly distributed Medullary rays fine and very fine, numerous, equidistant, the distance between the rays equal to the transverse diameter of the pores

South India Burma and the Andaman Islands

Growth moderate 8 to 10 rings per cubic foot Weight according to Brandis Burma List of 1862, No 83 45 lbs, but this specimen now weighs 51 lbs,

of 14 inches or nearly 4 rings per inch. The weight and transverse strength have been determined by the following experiments :—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	Number of experiments.	Size of bar.	Value of P.
Wallich . . . . .	...	India . . . . .	32	...	Ft. In. In.	...
1831 . . . . .	1831	Assam . . . . .	38	...	2 × 1 × 1	675
1820 . . . . .	1820	Bengal . . . . .	29	3	7 × 2 × 2	375
4. V. . . . .	"	" . . . . .	28	4	6 × 2 × 2	398
Wall. in D. . . . .	1862	Junagarh . . . . .	50? wet	4	7 × 2 × 2	324
Krawru, Magh . . . . .	1878	Burma . . . . .	35	...	...	...
A. tree. Ba . . . . .		as below . . . . .	36	18	...	...

close-grained. Aly worked and readily takes paint or varnish; it is very durable small, moderate-sized, highly esteemed for planking, furniture, door panels, carriages Medullary rays fine, very boats, toys, packing cases and all ornamental work; it

Assam, Chittagong and Burma. Images, clogs and canoes. It would probably be a Growth moderate, 6 to 8 rings per inch. chief furniture wood of Chittagong and is Used in Cachar for posts and beams, in the Garo, in 'Gleanings in Science,' Captain Bridges, spoke of Gumbhar wood as

E 784. Kámrúp, Assam . . . . . Venetians, and of much esti-  
E 1393. Chittagong . . . . . other such work where  
B 1423. Tharrawaddi, Burma . . . . . in the Calcutta

5. *V. leucoxydon*, Linn. f.; Roxb. Fl. Ind. iii. 74; Beddome clxxi. Brandis 370; Kurz ii. 273. *V. saligna*, Roxb. l. c. 75. Vern. *Goda*, *horina*, *ashwal*, Beng.; *Inki*, *neva-ledi*, Tel.; *Sengen*, *karril*, Kan.; *Tokra*, Magh; *Longarbi thiras*, Mar.; *Htouskha*, Burm.

A very large deciduous tree. Wood grey with a satiny lustre, hard, close-grained, durable. Annual rings marked by a prominent line. Pores small, often oval and subdivided, numerous. Medullary rays short, moderately broad and broad, marked as long shining bands on a radial section.

Chittagong, Burma, Andaman Islands and South India.

Growth moderate to fast, 3 to 12 rings per inch of radius, averaging 6 rings. The following experiments have been made to determine the weight and transverse strength :—

	Weight.	P.
1831, Kyd, with Assam wood, bars 2' × 1' × 1'	40	337
1864, Brandis, „ Burma „ 3' × 1' × 1'	39	763
„ „ „ 2' × 1' × 1'	39	508
1878, Warth, with Chittagong and Burma wood (below).	41	...
1862, Brandis, with Burma wood, No. 84	42	...

The wood is used for cart-wheels, and deserves attention for furniture and other purposes. The fruit is eaten by Burmese in the Andamans, and the bark and root used as an astringent (Major Ford).

	lbs.
E 1392. Chittagong . . . . .	45
B 330. Burma (1867) . . . . .	40
B 2549. „ (1862) . . . . .	40
B 2711. Tavoy (Wallich, 1828) . . . . .	36
B 2218. Andaman Islands (1866) . . . . .	44

## 6. CLERODENDRON, Linn.

Contains about 12 to 18 species of Indian shrubs or small trees. *C. phlomoides*, Linn.; Roxb. Fl. Ind. iii. 57; Beddome clxxxiv.; Brandis 363. Vern. *Urni*, Hind.; *Iran*, *arni*, Guz.; *Telaki*, Tel.; is a tall white-flowered shrub of the arid and northern

Wood between 40 and 55 lbs. in weight, hard, close-grained. Annual rings distinct. Pores small or moderate-sized. Medullary rays fine, uniform, numerous, equidistant.

1. *V. Negundo*, Linn.; Roxb. Fl. Ind. iii. 70; Beddome clxvi. Brandis 369. Vern *Marwan*, *moráun*, *máua*, *mora*, *wina*, *banna*, *torban*, *buuna*, Pb.; *Shwari*, *shawáli*, *nengar*, *mewi*, *nizunda*, Hind; *Begúza*; *Uiya*; *Nirgunda*, *nirgúr*, Mai; *Nugui*, Gondi, *Nirgudi*, Kurangi, *Vella nuchi*, Tam.; *Feyala*, Tel; *Lakki*, Kan; *Sudá nika*, Cingh; a shrub

A deciduous shrub, with thin grey bark. Wood greyish, tied round the neck. Annual rings marked by a narrow belt of more numerous Barangi, Hind; pores at the inner edge. Pores small and moderate-size and blue berries, rays numerous fine, uniform, equidistant.

Common in the drier parts of India, and ascending to 5,000 ft. in the Sundarbans. Himalaya, Nep, *Tongsor*, Lepcha, northern and Eastern Bengal.

Growth moderate, 7 rings per inch of radius. Nep, *Kadung*, Lepcha, is a small foot. The branches are used for wattle work. Kurz ii. 268, is an evergreen shrub of the and the leaves to cure headache. Used in toungyas.

H 3044 Kumbharsen sum, Walp.; Gamble 62. Vern. *Kadungbi*, C 2789 Melghat

— an evergreen tree with silvery grey bark. Wood grey, soft. Pores large and moderate-sized, often subdivided, the large pores arranged in interrupted concentric lines, and all pores, especially the smaller ones, joined by irregular concentric bands of softer tissue. Medullary rays moderately broad and fine, irregularly distributed.

Sikkim and Khasia Hills, 3,000 to 6,000 feet

Weight, 29 lbs per cubic foot. The whole plant has a strong disagreeable smell; the young leaves are eaten by Lepchas.

E 2401. Tukdah Forest, Darjeeling, 5,000 feet . . . . . lbs  
29

## 7. CARYOPTERIS, Bunge.

1. *C. Wallichiana*, Schauer; Brandis 370; Gamble 62. Vern. *Moni*, *moháni*, Kumaun; *Shechin*, Nep; *Malet*, Lepcha.

A large shrub with thin grey papery bark, peeling off in vertical strips. Wood dark grey, moderately hard, with the scent of cherry wood. Pores very small, often in groups, uniformly distributed. Medullary rays moderately broad, the distance between them much greater than the transverse diameter of the pores.

Outer Himalaya, from the Indus to Bhutan, ascending to 3,000 feet.

Growth rapid, 5 rings per inch of radius. Weight, 44 lbs per cubic foot. Has handsome lilac flowers.

E 2402. Chunbati, Darjeeling, 2,000 feet . . . . . lbs  
44

## 8. AVICENNIA, Linn.

1. *A. officinalis*, Linn.; Beddome clxiv.; Brandis 371; Kurz ii. 275. Vern. *Bani*, Beng.; *Mada*, *nalla mada*, Tel.; *Thamé*, Burm.

A shrub or small tree. Wood grey, with a darker heartwood, hard, heavy, consisting of numerous, narrow, well-marked, concentric layers; the inner portion of each layer is firm, with moderate-sized pores which



are often in short radial or oblique lines; the outer irregular narrower portion of each layer consists of soft tissue, with a few larger pores. Medullary rays fine, numerous, prominent in the inner layer of each ring.

Salt marshes, coast and tidal forests of India, Burma, and the Andaman Islands.

Weight, 58 lbs. per cubic foot. Wood very brittle, used only for firewood. Major Ford says it is used for mills for husking paddy, rice-pounders, and oil-mills in the Andamans.

E 398.	Sundarbans . . . . .	lbs.	58
B 2284.	Andaman Islands . . . . .		58

## ORDER LXXXI. LABIATÆ.

Contains a large number of herbaceous genera, a few only reaching the size of small shrubs or trees. There are about 7 Indian genera with woody species belonging to 5 tribes:—

Tribe I.—	Ocimoideæ . . . . .	<i>Plectranthus</i> .
„ II.—	Satureineæ . . . . .	<i>Colebrookia</i> and <i>Elsholtzia</i> .
„ III.—	Monardeæ . . . . .	<i>Meriandra</i> .
„ IV.—	Stachydeæ . . . . .	<i>Colquhounia</i> and <i>Roylea</i> .
„ V.—	Ajugoideæ . . . . .	<i>Teucrium</i> .

*Colquhounia elegans*, Wall.; Kurz ii. 278, is a scandent shrub of the hill forests of Martaban at 4,000 to 5,000 feet. *C. coccinea*, Wall., and *C. vestita*, Wall., are scandent shrubs of Nepal and the Eastern Himalaya.

Wood light-coloured, hard. Pores small or very small, generally in groups. Medullary rays moderately broad, distant.

### 1. PLECTRANTHUS, L'Hér.

1. *P. rugosus*, Wall. Vern. *Khwangere*, Trans-Indus; *Itsit*, Salt Range; *Bûi*, Jhelam; *Solei*, Kashmir; *Piûmar*, *chûgû*, Chenab; *Kot*, *siringri*, Ravi; *Pek*, *rosbang*, *chichri*, Sutlej.

A small shrub with brown bark. Wood grey, hard. Pores small and very small. Medullary rays moderately broad. Annual rings marked by a narrow belt of more numerous pores.

Common on dry hill-sides and rocks in the North-West Himalaya and Salt Range above 3,000 feet.

H 2840. Simla, 7,000 feet.

### 2. COLEBROOKIA, Sm.

*C. ternifolia*, Roxb., is a shrub of the hills of the Carnatic.

1. *C. oppositifolia*, Sm.; Kurz ii. 277; Gamble 63. Vern. *Shakardana*, Trans-Indus; *Phis bekhar*, Salt Range; *Dûss*, *sampni*, Jhelam; *Sûáli*, Chenab; *Dûss*, Ravi; *Briali*, *basuti*, Beas; *Barmera*, Sutlej; *Dulskat*, Kumaun; *Dosûl*, Nep.

A shrub with grey bark. Wood greyish white, moderately hard, close-grained. Pores very small, in groups. Medullary rays moderately broad; the distance between the rays several times larger than the transverse diameter of the pores.

Outer Himalaya, from the Indus to Bhutan, ascending to 4,000 feet

Weight, 46 lbs per cubic foot The wood is used for gunpowder charcoal, and the leaves applied to wounds and sores (*Stewart*)

H 3046 Below Komharsen, Sutlej Valley, 2,500 feet . . . lbs  
46

### 3. ELSCHOLTZIA, Willd

1. *E. polystachya*, Benth. Vern. *Rangchari*, *mehndi*, Jhelam; *Garúdar*, *tappaddar*, Chenab; *Dúss*, Ravi, *Pothi*, Sutlej, *Bhangria*, Kumaun.

Wo . . . . . nal strips.  
into . . . . . separates  
a belt of  
numerous and larger pores in the spring wood Pores small and very  
small, often subdivided, those in the outer belt of the annual ring  
arranged in groups. Medullary rays moderately broad, the distance  
between the rays larger than the transverse diameter of the pores.

North-Western Himalaya, from the Jhelam eastwards, and the Khasia Hills, from 6,000 to 10,000 feet

Growth slow, 15 rings per inch of radius Weight, 42 lbs per cubic foot  
Common in forest undergrowth, growing often to 10 or 12 feet high

H 2841 } lbs.  
H 2936 } Mahasu, Simla, 7,000 feet . . . . . 42

### 4. MERIANDRA, Benth.

*M. bengalensis*, Bth, is often cultivated in Indian gardens as a substitute for sage.

1. *M. strobilifera*, Benth.

A small shrub with grey bark. Wood white, hard. Pores small and very small. Medullary rays fine, numerous. Annual rings marked by an interrupted line of larger pores on the inner edge, and a narrow belt of firmer wood on the outer edge of each ring.

scent of sage, they are distinguished  
by sagittate. The shrub is chiefly found

H 2839 Simla, 6,500 feet

### 5. ROYLEA, Wall.

1. *R. elegans*, Wall. Vern. *Kaur*, *kaurs*, Pb.; *Tirpáti*, Kumaun; *Patkarru*, Hind

A shrub with grey bark. Wood white, hard. Pores small and very small, in groups and short tails. Medullary rays moderately broad, unequally distributed.

North-West Himalaya, from the Ravi to Nepal, up to 3,000 feet.  
A handsome shrub. Weight, 52 lbs per cubic foot.

H 3045 Komharsen, Sutlej Valley, 4,000 feet . . . . . lbs  
52

are often in short radial or oblique lines; the outer irregular narrower portion of each layer consists of soft tissue, with a few larger pores. Medullary rays fine, numerous, prominent in the inner layer of each ring.

Salt marshes, coast and tidal forests of India, Burma, and the Andaman Islands.

Weight, 58 lbs. per cubic foot. Wood very brittle, used only for firewood. Major Ford says it is used for mills for husking paddy, rice-pounders, and oil-mills in the Andamans.

E 398.	Sundarbans	.	.	.	.	.	.	.	.	lbs.
B 2284.	Andaman Islands	.	.	.	.	.	.	.	.	58
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## ORDER LXXXI. LABIATÆ.

Contains a large number of herbaceous genera, a few only reaching the size of small shrubs or trees. There are about 7 Indian genera with woody species belonging to 5 tribes:—

Tribe I.—Ocimoidæ	.	.	.	.	.	<i>Plectranthus</i> .
„ II.—Satureiæ	.	.	.	.	.	<i>Colebrookia</i> and <i>Elsholtzia</i> .
„ III.—Monardæ	.	.	.	.	.	<i>Meriandra</i> .
„ IV.—Stachydæ	.	.	.	.	.	<i>Colquhounia</i> and <i>Roylea</i> .
„ V.—Ajugoidæ	.	.	.	.	.	<i>Teucrium</i> .

*Colquhounia elegans*, Wall.; Kurz ii. 278, is a scandent shrub of the hill forests of Martaban at 4,000 to 5,000 feet. *C. coccinea*, Wall., and *C. vestita*, Wall., are scandent shrubs of Nepal and the Eastern Himalaya.

Wood light-coloured, hard. Pores small or very small, generally in groups. Medullary rays moderately broad, distant.

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A small shrub with brown bark. Wood grey, hard. Pores small and very small. Medullary rays moderately broad. Annual rings marked by a narrow belt of more numerous pores.

Common on dry hill-sides and rocks in the North-West Himalaya and Salt Range above 3,000 feet.

H 2840. Simla, 7,000 feet.

### 2. COLEBROOKIA, Sm.

*C. ternifolia*, Roxb., is a shrub of the hills of the Carnatic.

1. *C. oppositifolia*, Sm.; Kurz ii. 277; Gamble 63. Vern. *Shakardana*, Trans-Indus; *Phis bekhar*, Salt Range; *Dúss*, *sampni*, Jhelam; *Súáli*, Chenab; *Dúss*, Ravi; *Briali*, *basuti*, Beas; *Barmera*, Sutlej; *Dulskat*, Kumaun; *Dosúl*, Nep.

A shrub with grey bark. Wood greyish white, moderately hard, close-grained. Pores very small, in groups. Medullary rays moderately broad; the distance between the rays several times larger than the transverse diameter of the pores.

C. A. T. C. A. T. C. A. T. C. A. T. n, ascending to 4 000 feet  
is used for gunpowder charcoal and the

H 3016 Below Komharsen Sutlej Valley 2 500 feet

lbs  
46

### 3 ELSCHOLTZIA, Willd

1. *E. polystachya*, Benth Vern *Rangchari*, *mehudi*, Jhelam, *Garudar*, *tappaddar*, Chenab, *Duss*, Ravi, *Pothi*, Sutlej, *Bhangria*, Kumaun

A shrub with grey, fibrous bark, peeling off in thin, longitudinal strips. Wood grey, moderately hard, splits and cracks, and in seasoning separates into concentric masses. Annual rings distinctly marked by a belt of numerous and larger pores in the spring wood. Pores small and very small, often subdivided, those in the outer belt of the annual ring arranged in groups. Medullary rays moderately broad, the distance between the rays larger than the transverse diameter of the pores.

North Western Himalaya from the Jhelam eastwards and the Khasia Hills from 6 000 to 10 000 feet

Growth slow, 15 rings per inch of radius. Weight 42 lbs per cubic foot. Common in forest undergrowth, growing often to 10 or 12 feet high.

H 2841 }  
H 2936 } Mahasu, Simla 7 000 feet

lbs  
42

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A small shrub with grey bark. Wood white, hard. Pores small and very small. Medullary rays fine, numerous. Annual rings marked by an interrupted line of larger pores on the inner edge, and a narrow belt of firmer wood on the outer edge of each ring.

North West Himalaya from the Ravi to Nepal up to 6 000 feet. The scent of sage they are distinguished by being sagittate. The shrub is chiefly found on dry rocks especially limestone.

H 2839 Simla 6 500 feet

### 5. ROYLEA, Wall

1 *R. elegans*, Wall Vern *Kaur*, *kauri*, Pb, *Titpati*, Kumaun, *Patkarru*, Hind

A shrub with grey bark. Wood white, hard. Pores small and very small, in groups and short tails. Medullary rays moderately broad, unequally distributed.

North West Himalaya from the Ravi to Nepal up to 3 000 feet. A handsome shrub. Weight 52 lbs per cubic foot.

H 3015 Komharsen Sutlej Valley, 4 000 feet.

lbs.  
52

## 6. TEUCRIUM, Linn.

1. *T. macrostachyum*, Wall. ; Gamble 62. Vern. *Matsola*, *gurupis*, Nep. ; *Chúng*, Lepcha.

A small evergreen tree. Bark thin, corky. Wood yellowish white, moderately hard, close and even-grained. Pores small, in groups. Medullary rays moderately broad, numerous. Annual rings indistinctly marked.

Eastern Himalaya from Nepal eastwards, Khasia Hills and Sylhet, from 5,000 to 8,000 feet.

Growth rapid, 3 to 5 rings per inch of radius. Weight, 38 to 41 lbs. per cubic foot. A common tree in second growth forests in the Sikkim Hills, and easily recognised by its greyish foliage and long erect spikes of dirty white flowers with long-exserted stamens. Its wood is a fair fuel. It coppices well and strikes easily from cuttings.

	lbs.
E 2411. Rangbíl, Darjeeling, 7,000 feet . . . . .	41
E 3376. Darjeeling, 6,500 feet. . . . .	38

## ORDER LXXXIII. NYCTAGINEÆ.

Contains one genus of Indian trees—*Pisonia aculeata*, Linn. ; Beddome clxxv. ; Kurz ii. 279, is a large straggling climber of Southern India and of the coast forests of Burma and the Andaman Islands. *P. alba*, Span, and *P. umbellifera*, Seem. ; Kurz ii. 279, 280, are evergreen trees of the coast forests of the Andamans. To this family belong the beautiful *Bougainvilleas*, common in gardens, and the Marvel of Peru, *Mirabilis Jalapa*, cultivated or run wild over the greater part of India.

## ORDER LXXXIV. AMARANTACEÆ.

A large genus of herbaceous plants containing only 2 or 3 genera of Indian shrubs. *Deeringia baccata*, Moq. ; Gamble 63 (*D. celosioides*, R. Br. ; Roxb. Fl. Ind. i. 682) Vern. *Gola mohani*, Beng. ; *Kala lodri*, Kumaun ; *Latman*, Hind., is a common climber of Northern India, climbing over bushes and covering them in the cold season with its long branches covered with bright crimson berries.

## 1. RODETIA, Moquin-Tandon.

1. *R. amherstiana*, Moq. *Deeringia Amherstiana*, Wall. Vern. *Bilga*, Koti.

A large straggling shrub, with thin, brown, rough bark. Wood grey, soft, divided by concentric and anastomosing bands of cellular tissue into irregular, narrow, concentric belts, which are subdivided into oblong porous areas by short medullary rays varying in breadth, which often gradually widen where they join the concentric bands of cellular tissue. Pores moderate-sized, numerous.

North-west Himalaya and Burma.

Weight, our specimen gives 41 lbs. per cubic foot. It seems to be often grown as a hedge ; the young shoots are eaten fried in ghee, and a black dye is obtained from the leaves. The berries, which are bright crimson, resembling those of *Deeringia*, are also eaten.

	lbs.
H 3097. Koti, near Simla, 6,000 feet . . . . .	41

## ORDER LXXXV. POLYGONEÆ.

A large Order of herbaceous plants, containing only 3 genera which have woody plants indigenous in India, viz, *Calligonum*, *Polygonum* and *Rumex*

## 1. CALLIGONUM, Linn.

1. C - - - - - ndis 372. Vern. *Balanja, berwaja, tatúke,*

A slow-growing shrub. Dark reddish grey, rough, peeling off in long thin flakes, inner substance red. Most old stems are hollow. Heartwood reddish brown, very hard. Annual rings distinctly marked by a continuous belt of moderate-sized and large pores; in the outer portion of each annual ring the pores are small, in groups, scanty, often joined by wavy lines of soft tissue. Medullary rays fine, numerous.

Arid zone of Sind, the Punjab and Rajputana, Afghanistan and Western Asia.

It is chiefly used for fuel, but twigs and branches are sometimes employed for the walls and roofs of huts. The abortive flowers are swept up and eaten, either made into bread or cooked with ghee

P 889. Multán.

## 2. POLYGONUM, Linn.

Contains several shrubs of the Himalaya, some with very handsome flowers, but none of any importance, except the one described. Besides the shrubs there are a large number of herbaceous plants belonging to this genus, many of them very common.

1. P. molle, Don; Gamble 63 Vern *Totnye, tuknu, patu-swa*, Nep.

A large trailing shrub, with thin, dark grey bark and hollow stems. Wood reddish white. Annual rings marked by a belt of moderate-sized pores; in the outer portion of each ring the pores are small, scanty, often in groups. Medullary rays moderately broad, often in pairs, irregularly distributed.

Hills of Sikkim and Bhutan, from 5,000 to 8,000 feet

An extremely com

The young shoots are doubt about the name

*Ham*, in Don Prodr Fl Nep 74 It has the enlarged succulent calyx of *Coccoloba* round the fruit

E 2412 Rangbi, Darjeeling, 5,000 feet

## 3. RUMEX, Linn.

1. R. hastatus, Don. Vern. *Katambal, khattimal*, Jhelam; *Ami*, Chenab, Ravi; *Malorigha, amla*, Beas; *Amlora*, Sutlej, *Almora*, Kumaun.

Generally an undershrub, sometimes a shrub. Wood light red, moderately hard. Pores small, more numerous at the inner of the annual rings. Medullary rays broad and very broad.

North West Himalaya from 2,500 to 9,000 feet, chiefly on

The leaves are acid and are eaten as sorrel.

H 3018. Kot, Sutlej Valley, 2,500 feet.

*Atraphaxis spinosa*, Linn, Brandis 373, is a thorny shrub istan and Beluchistan belonging to this family.

## ORDER LXXXV. LAURACEÆ.

A large Order containing 17 genera of Indian trees, many of which are important. These genera belong to 4 tribes, viz.—

- Tribe I.—Perseaceæ . . . . . *Cinnamomum*, *Alseodaphne*, *Phæbe*,  
*Machilus*, *Haasia*, *Beilschmiedia*  
and *Apollonias*.  
,, II.—Cryptocaryæ . . . . . *Cryptocarya*.  
,, III.—Litsæaceæ . . . . . *Tetranthera*, *Cylicodaphne*, *Dode-*  
*cadenia*, *Actinodaphne*, *Litsæa*,  
*Daphnidium*, *Aperula* and *Lindera*.  
,, IV.—Hernandiæ . . . . . *Hernandia*.

*Nectandra* and *Sassafras* belong to the Sub-Order Oreodaphneæ, *Persea* to Perseaceæ and *Laurus* to Litsæaceæ. The identification of many of the species of the Order is very difficult, and few Orders more require further and careful investigation.

*Haasia Wightii*, Nees; Beddome t. 298, is a tree of the Anamalai Hills and the Ghâts of Tinnevely and Travancore. *Apollonias Arnottii*, Nees; Beddome t. 291; Brandis 377, is a tree of the Tinnevely and Travancore Ghâts and Malabar.

*Cryptocarya* contains about 6 species. *C. Wightiana*, Thw.; Beddome t. 299, is a large tree of the Western Ghâts and Ceylon. *C. Stocksii*, Meissn., is a tree of Kanara; and *C. Neilgherrensis*, Meissn., of the Nilgiri Hills. *C. floribunda*, Nees, and *C. amygdalina*, Nees; Gamble 64. Vern. *Patmaro*, Nep.; *Kaledzo*, Lepcha, are trees of the outer Sikkim Himalaya and Eastern Bengal. *C. ferrea*, Bl.; and *C. Griffithiana*, Wight; Kurz ii. 295, are trees of Tonasserim.

*Cylicodaphne* contains about 8 species placed by Beddome and Kurz under *Tetranthera*, but separated by Meissner in DC. Prodrômus, Vol. XV. *C. nitida*, Meissn. (*Tetranthera nitida*, Roxb.; Kurz ii. 302. Vern. *Kotoloah* Ass.) is a large tree of Eastern Bengal and Burma upon whose leaves the "Muga" silkworm (*Antheræa Assama*) is sometimes fed. *C. Wightiana*, Nees, is a tree of Assam, South India and Ceylon. *Dodecadenia grandiflora*, Nees; Brandis 381; Kurz ii. 304, is an evergreen tree of the Himalaya from Kumaun eastwards. *Actinodaphne* contains about 9 species. *A. angustifolia*, Nees; Beddome clxxxvi.; Brandis 381 (*Litsæa angustifolia*); Kurz ii. 305. Vern. *Samkoh*, Ass., *Boltanaro*, Gáro; *Tabongdeing*, Magh, is a large evergreen tree of Eastern Bengal, South India and Burma. *A. salicina*, DC.; Beddome t. 295, Kurz ii. 305, is a tree of the Western Ghâts and Ceylon. *A. Hookeri*, Meissn.; Beddome t. 296; Brandis 381, is a small tree of Sikkim and the Eastern and Western Ghâts of South India. *A. obovata*, Hook. f. and Th.; Gamble 65. Vern. *Muslindi*, Nep.; *Pohor*, Lepcha; *Laiphanzeh*, Mechi; *Cherritinga*, Ass., is a large evergreen tree of the outer Sikkim Himalaya, Assam, Khasia Hills and Sylhet, with large 3-nerved leaves, generally in whorls. *Aperula* contains 2 trees: *A. assamica*, Meissn. (*Lindera assamica*, Kurz ii. 308), of Sikkim, Assam and the Martaban Hills; and *A. Neesiana*, Bl.; Brandis 383. (*Lindera Neesiana*, Kurz ii. 309) Vern. *Karaway*, Burm., of Nepal, Sikkim and Burma, yielding, according to Kurz, excellent sassafras. *Lindera* contains about 5 species, chiefly of Sikkim and Bhutan, the chief among which is *L. heterophylla*, Meissn., of the hills of Sikkim at 8,900 to 9,000 feet. *Hernandia peltata*, Meissn.; Beddome t. 300; Kurz ii. 309. Vern. *Uparanthi* Mysore; *Palati*, Cingh., is an evergreen tree with peltate leaves found in the coast forests of the Andamans and Ceylon. Beddome says that the wood is very light and takes fire readily, that the juice is a powerful depilatory, removing the hair without pain, and that the seed and young leaves are cathartic. *Persea gratissima* is the fruit tree, the Avocado Pear, cultivated in India. The bay laurel is *Laurus nobilis*.

The wood of the Indian laurels is generally light-coloured, soft or moderately hard, without heartwood, even-grained, seasoning well without splitting. They have, with few exceptions, an exceedingly uniform structure. Pores small or moderate-sized, uniformly distributed. Medullary rays fine, uniform and equidistant. Annual rings distinctly

marked in most species either by a sharp line, or by a firmer belt of wood in the outer portion of the ring.

### 1. CINNAMOMUM, Burman.

According to Meissner this genus contains 16 Indian species, 5 of which from

It contains 2  
ally with penni  
sn, Beddome &  
Kurz n 288, is a  
sserim. *C. iners*,  
tree of Eastern  
in tree *C. sm-*  
*audatum*, Nees,  
a round leaved  
reyn, Beddome  
*arruwa*, Tam ;

camphor is obtained.

Wood soft, seasons well, and does not warp or crack. Pores well marked on a longitudinal section. Medullary rays uniform and equidistant. The leaves and bark, as well as the wood of many species, are aromatic.

1. *C. ...* idis 375, Kurz n. 287; Gamble 63.  
l. n. 302. Vern *Tezpat*, *ramlezpat*,  
*Nupsor*, Lepcha, *Patichanda*, Ass.;  
*Loolengkyau*, Burm.

An evergreen tree, with grey aromatic bark  $\frac{1}{4}$  inch thick. Wood reddish grey, moderately hard, shining, mottled on a vertical section by the medullary rays, the pores containing a gummy substance which exudes copiously on the wood being wetted. Annual rings very indistinctly marked. Pores moderate-sized, often subdivided, uniformly distributed in frequently grouped oblique lines. Medullary rays moderately broad, slightly undulating, prominent on a radial section as long narrow plates. The wood has a kind of lustre, and the bark of the roots is highly aromatic.

Outer North East Himalaya to 7,000 feet, Eastern Bengal, Burma, and Andaman Islands

tree  
idius  
that  
uma)  
sometimes feeds on its leaves

E 498 Sukna Forest, Darjeeling Terai

E 693 Sapoypura Forest, Darjeeling, 5 500 feet

lbs

44

38

### 2. *C. pauciflorum*, Nees. Vern. *Dinglatterdop*, Khasia



LAURACEÆ.

Wood light red, very aromatic, beautifully mottled on a radial section by the medullary rays, rough, hard. Pores moderate-sized, often in radial lines. Medullary rays moderately broad, numerous. Assam Valley, Khasia Hills and Sylhet. Growth fast, 4 rings per inch of radius. Weight, 39 lbs. per cubic foot.

- E 798. Khasia Hills, 5,000 feet  
 3. *C. Tamala*, Nees; Brandis 374; Gamble 63. *C. albiflorum*,  
 Nees; Wight Ic. t. 140. *C. Cassia*, Bl.; Kurz ii. 288. *Laurus Cassia*,  
 Roxb. Fl. Ind. ii. 297. *Cassia Cinnamon*. Vern. *Dālchīni*, *kirkirā*;  
*kikra*, *sinkami*, *silkanti*, Hind.; *Chota sinkoli*, Nep.; *Nupsor*, Lepcha;  
*Dopatti*, Ass.  
 A moderate-sized evergreen tree. Bark thin, compact, brown, wrinkled, with an aromatic taste. Wood reddish grey, splits and warps moderately hard, close-grained, slightly scented. Annual rings distinctly marked by a narrow belt of firmer wood on the outer edge with fewer pores. Pores small to moderate-sized. Medullary rays fine, numerous, equidistant.

Himalaya, sparingly from the Indus to the Sutlej, common thence eastwards between 3,000 and 7,800 feet, Eastern Bengal, Khasia Hills and Burma. Growth moderate, the Darjeeling specimen showing 6 rings, that from Jaunsar 7, and the Hazara one 10 rings per inch of radius. Weight, 39 lbs. per cubic foot. The wood is not used. The bark is largely collected and sold under the name of *Tajpat*. The leaves are also much sold under the names *Tezpat*, *tajpat*.

- H 937. Hazara, 4,000 feet  
 H 3162. Dungagalli, Hazara, 4,000 feet  
 H 427. Bagiwar Forest, Jaunsar, 4,000 feet  
 E 575. Sukna Forest, Darjeeling Terai

4. *C. glanduliferum*, Meissn.; Brandis 376; Gamble 64.  
 Nepal Camphor Wood. Vern. *Malligiri*, *marisgiri*, Nep.; *Rohu*, Lepcha.  
*Gunserai*, Mechi, Ass.; *Gundroi*, Cachar.  
 A large tree. Bark 1 to 2 inches thick, dark grey, uneven, corky, highly scented. Wood rough, pale brown, highly scented with strong smell of camphor when fresh cut, has a certain lustre. Wood distantly resembles that of an *Albizia* on a vertical section is rougher; it is soft to moderately hard, even-grained. Annual rings marked by a distinct line. Pores between moderate-sized and uniformly distributed, often oval and subdivided and filled with glittering resinous substance. Medullary rays short, numerous, finely distributed, fine or moderately broad, the distance between the rays generally less than the transverse diameter of the pores. Distinctly marked on a vertical section.

South Himalaya from Kumaun eastwards, Assam, Khasia Hills and Garo Hills. Growth fast, 2 to 3 rings per inch of radius. Weight, 38.5 lbs. per cubic foot. Wood durable, easily worked, is not touched by insects. It is used for canoes and boat-building; in Sikkim for boxes, almirahs and other articles of planking. It is being tried for sleepers.

- E 670. Dulka Jhar, Darjeeling Terai  
 E 2413. Tista Valley, Darjeeling  
 E 628. Eastern Dúars, Assam  
 E 639. Kámrúp, Assam  
 E 2304. " " " " " " " "

5. *C. sp* (perhaps *C. Parthenoxylon*, Meissn., Kurz ii 280, or *Aperula Neesiana*, Bl., see Brandis 383). Vern *Kasaway*, Burm

Wood orange-brown, scented, moderately hard, only to the touch. Pores moderate-sized and large, often subdivided, filled with resin, the transverse diameter often equal to, or slightly larger than, the distance between the fine, prominent, medullary rays. It resembles the wood of *C. glanduliferum* in structure.

South Tenasserim

Weight, 43 to 46 lbs per cubic foot. Wood durable, used for house building and shingles

B 1915	Tavoy	.	lbs
B 2483	"	.	43
			46

6. *C. sp* Vern *Hmanthin*, Burm

Wood white with a pink tinge, shining, moderately hard, highly scented. Pores moderate sized, often subdivided, frequently filled with resin, their transverse diameter generally equal to the distance between the short, fine, prominent medullary rays. In structure the wood most resembles that of *C. obtusifolium*

South Tenasserim

Weight, 36 to 43 lbs per cubic foot. The wood is plentiful at Tavoy and Mergui, where it is used for building

B 1946	Tavoy	.	lbs
B 2482	"	.	43
			36

7. *C. sp* Vern *Sinkozu*, Burm.

Wood red, soft, strongly scented. Pores moderate-sized, often subdivided, their transverse diameter generally equal to, or less than, the distance between the short and fine medullary rays. Somewhat resembles in structure the wood of *C. parviflorum*.

South Tenasserim

Weight, 41 lbs. Found by the late Mr Lee in Mergui, but rather scarce

B 1387.	Tavoy	.	lbs
			41

Nos B 293, Burma (1867), 24 lbs., B 2691 (40 lbs.), B 2695 (39 lbs.), B 2719 (36 lbs.), Tavoy (Wallich, 1828), are all evidently Lauraceæ and probably *Cinnamomum*. They have a light, soft, aromatic wood. Pores moderate-sized, generally subdivided. Medullary rays fine, equidistant, numerous.

## 2. ALSEODAPHNE, Nees

*A. semecarpifolia*, Nees, Beddome t. 297. Vern *Wicarana* Cingh., is a large tree of the Western Ghats and Ceylon, where it is known as a valuable timber of a yellow colour, which resists the attacks of "teredo" and is used for building and boats. *A. grandis*, Nees, Kurz ii 293, is an evergreen tree of Burma with a yellowish wood.

1. *A. sp* Vern *Douk-poma*, Assam

Wood soft, red, even-grained. Pores small, in radial lines. Medullary rays fine, red, equidistant, visible on a radial section.

Assam

Weight, 32 lbs per cubic foot. Used for boats, furniture and building

E 633	Eastern Duars, Assam	.	lbs.
			32

## 3. PHŒBE, Nees.

Contains about 7 species. *P. pallida*, Nees; Brandis 377. Vern. *Kanwál*, Kumaun, is a small tree of the Himalaya from Kumaun eastwards and Burma. *P. paniculata*, Nees; Brandis 377 [*P. villosa*, Wight, and *P. pubescens*, Nees, Kurz ii. 290. *P. Wightii*, Meissn.; Beddome t. 292 (probably). *Laurus villosa* Roxb. Fl. Ind. ii. 310 (probably)] Vern. *Kumara*, Burghers; *Kapua kanwál* Kumaun; *Boltigachu*, Gáro; *Chekio*, Magh, is a tree of the Eastern Himalaya, Eastern Bengal, Burma and South India, with, according to Beddome, a good wood of a light red colour. *P. angustifolia*, Nees, is a tree of the Khasia Hills. *P. glaucescens*, Nees; Gamble 64. Vern. *Surúl*, Nep., is a tree of the Eastern Himalaya and Eastern Bengal.

1. *P. lanceolata*, Nees; Brandis 377; Kurz ii. 290; Gamble 64. *Laurus lanceolaria*, Roxb. Fl. Ind. ii. 309. Vern. *Chan, chandra, badror, shalanghi*, Pb.; *Haulia, dandorla, káwal, sún kawal, bilphari*, Hind.; *Dupatti*, Meehi; *Nuni ajhar*, Gáro; *Sun kanwál*, Kumaun.

A small evergreen tree. Wood white, hard, close-grained. Annual rings marked by a distinct line. Pores moderate-sized, often oval and subdivided, or in short radial lines, uniformly distributed. Medullary rays fine, equidistant. The wood turns brown on exposure, and varies in colour in different localities.

Outer Himalaya from the Jumna to Bhutan, ascending to 6,000 feet, Khasia Hills, Sylhet, Burma and the mountains of South India.

Growth fast, 3 to 4 rings per inch of radius. Weight, 46 to 55 lbs. per cubic foot.

H 91.	Bhajji, Simla, 4,000 feet						lbs.
E 2415.	Chunbati, Darjeeling, 2,500 feet	.	.	.	.	.	46
		.	.	.	.	.	55

2. *P. attenuata*, Nees; Gamble 64. Vern. *Dudri*, Nep.; *Lepcha-phal*, Darjeeling; *Phani*, Lepcha.

A large evergreen tree. Wood grey, turning darker on exposure, hard, even-grained. Annual rings marked by a distinct line. Pores large and moderate-sized, uniformly distributed, frequently oval and subdivided. Medullary rays fine, equidistant.

Sikkim and Bhutan, from 4,000 to 8,000 feet, hills of Eastern Bengal.

Growth moderate, 5 to 9 rings per inch of radius. Weight, 39 to 44 lbs. per cubic foot. Much used at Darjeeling for building, for tea-boxes and other purposes. The fruit is large, when ripe the size of a green walnut; it is eaten by Lepchas. (The identity of this species requires further investigation; it is a very handsome tree with long, narrow leaves.)

E 363.	Rangbúl, Darjeeling, 7,000 feet	.	.	.	.	.	lbs.
E 2416.	Chuttockpur Forest, Darjeeling, 6,000 feet	.	.	.	.	.	44
		.	.	.	.	.	39

## 4. MACHILUS, Rumphius.

Contains about 9 species. *M. macrantha*, Nees; Beddome t. 264. Vern. *Kromá*, Burghers; *Iruli*, Kaders; *Kurma*, Kan.; *Ullalu*, Cingh., is a large tree of the Western Gháts and Ceylon, with a soft, light, even-grained wood, used for building. *M. rimosa*, Bl., *M. fruticosa*, Kurz, and *M. tavoyana*, Meissn.; Kurz ii. 292, are trees of Tenasserim. *M. khasyana*, Meissn., is a tree of the Khasia Hills.

1. *M. odoratissima*, Nees; Brandis 378; Gamble 64. *M. indica*, Lour.; Kurz ii. 291. Vern. *Dalchini, mith-patta, prora, badror, leddil*, Pb.; *Kawala*, Hind.; *Kawala, lali, jagrikat*, Nep.; *Phamlet*, Lepcha; *Soom*, Ass.; *Dingpingwait*, Khasia.

A large tree. Wood grey, darkening and turning red on exposure, soft to moderately hard, even-grained. Pores moderate-sized, often oval and subdivided, their transverse diameter equal to the distance between the uniformly distributed fine medullary rays. Annual rings very indistinct.

of radius, a tree  
s per inch. Weight  
mon, for building,  
e forests, which are  
ve the "Muga" or  
"Moonga" silk. This silk, which is chiefly produced on the *Soom* tree, is also pro-

by Dr Brandis

		lbs
H 92	The Glen, Simla, 6,000 feet	37
H 929	Hazara, Punjab	39
E 435.	Rangbul Forest, Darjeeling, 7,000 feet	43
E 2414	" " " "	38
E 592	Khookloong Forest, Darjeeling Terai	43
E 1271.	Lakhimpur, Assam	43

## 5. BEILSCHMIEDIA, Nees.

Contains about 4 species. *B fagifolia*, Nees, Beddome t 263, Brandis 379, is a large tree of the Western Ghâts with a good timber used for building. *B macrophylla*, Meissn, is a tree of Mergui. *B assamica*, Meissn, is a tree of Assam, and *B globularia*, Kurz, a tree of the hill forests of Martaban.

1. *B. Roxburghiana*, Nees, Brandis 378, Kurz ii 293; Gamble 64. *Laurus bilocularis*, Roxb. Fl. Ind. ii 311 Vern. *Konháiah*, Ondh; *Tarsing*, Nep., *Kanyu*, Lepcha, *Tapchi*, Gáro, *Serai-guti*, Ass, *Skatoo-beng*, Burm.

An evergreen tree. Wood white, moderately hard, even-grained; heartwood with red and green streaks. Annual rings marked by sharp lines. Pores moderate-sized, scanty, oval and subdivided. Medullary rays fine and very fine, numerous.

Eastern Himalaya up to 8,000 feet, Eastern Bengal, Burma and the Andaman Islands.

Growth moderate, 5 to 9 rings per inch of radius. Weight, 36.5 lbs per cubic foot. Wood used in Assam for boats, in Darjeeling for building, tea-boxes and other purposes.

	lbs
E 1258. Tezpur, Assam	36
E 1264	39
E 700 "Chuttockpur" Forest, Darjeeling, 8,000 feet	35
E 2419 Rangbul " " 7,000 "	36

These two last have less numerous pores.

## 6. TETRANTHERA, Jacq.

is a tree in the "Drosera" as occurring in India and Bur.

land. In Assam the leaves are used to feed the silkworms which produce the "muga" silk (*Antheraea Assama*). *T. grandis*, Wall.; Kurz ii. 299, is an evergreen tree of the forests of Burma, having, according to Kurz, a handsome yellow wood with a fine lustre. *T. Wightiana*, Wall.; Beddome t. 293. Vern. *Keyngee*, Burghers'; *Ham-madi*, Kan. is a tree of the forests of the Western Ghâts from 2,000 to 8,000 feet, having a handsome yellow wood, which is used for building. *T. glauca*, Wall.; Kurz ii. 300; Gamble 65. Vern. *Sempat*, Nep.; *Digilati*, Meehi; *Digloti*, Ass., is an evergreen tree of the outer Eastern Himalaya and Eastern Bengal on the leaves of which in Assam the Muga silkworms are sometimes fed.

1. *T. laurifolia*, Jacq.; Brandis 379; Kurz ii. 297; Gamble 65. *T. apetala*, Roxb. Fl. Ind. iii. 819. Vern. *Maida*, *meda*, *gwa*, *rián*, *chandra*, Pb.; *Garbijawr*, *singrauf*, *medh*, *ménda*, Hind.; *Suppatnyok*, Lepcha; *Kukúr chita*, Beng.; *Narra alagi*, Tel.; *Ungdung*, Burm.

A moderate-sized evergreen tree. Bark 1 inch thick. Wood greyish brown or olive grey, moderately hard, shining, close and even-grained, seasons well, durable, is not attacked by insects. Annual rings indistinctly marked by a white line. Pores small and moderate-sized, often subdivided, uniformly distributed. Medullary rays fine and moderately broad.

Kumaun, Garhwal, Bengal, Burma, Central and South India.

Growth moderate, 6-7 rings per inch of radius. Weight, 47 lbs. per cubic foot. A fine wood worth notice. The bark is used medicinally for external application bruised and mixed with goat's milk, for sprains and bruises.

		lbs.
O 253.	Garhwál (1868)	48
O 1378.	Gonda, Oudh	45
O 1484.	Kheri "	48
D 1087.	Madura, Madras	46
B 2286.	Andaman Islands (1866)	47

2. *T. monopetala*, Roxb. Fl. Ind. iii. 821; Brandis 380; Kurz ii. 299; Gamble 65. Vern. *Meda*, *gwa*, *singraf*, *sangran*, *marda*, *kat marra*, *kakúri*, *kerauli*, *patoia*, *katmoría*, *papria*, *katmedh*, *kari*, *rand-kari*, Hind.; *Mendah*, *kari*, *kjera*, *toska*, *leja*, Gondi; *Leinja*, Kurku; *Ratmanti*, *kadmero*, Nep.; *Suphut*, Lepcha; *Bút*, *mogasong*, Meehi; *Sualu*, Ass.; *Huara*, Cachar; *Bolbek*, Gáro; *Ranamba*, Mar.; *Ungdung*, Burm.

A moderate-sized evergreen tree. Bark dark grey, smooth, when old exfoliating in corky scales. Wood olive grey, soft, not durable, is readily attacked by insects. Annual rings indistinct. Pores moderate-sized, uniformly distributed, often oval and subdivided. Medullary rays short, fine. The wood is very similar to that of *T. laurifolia*, but is softer, not durable, and the annual rings are not well marked.

Sub-Himalayan tract from the Ravi eastwards, Kumaun, Garhwal, Bengal, Burma, Central and South India.

Growth moderate to fast, 2 to 6 rings per inch of radius. Weight, 38 lbs. per cubic foot. The wood is used for agricultural implements. The leaves are used in Assam to feed the "muga" silkworms *Antheraea Assama*; they have a cinnamon-like smell when bruised.

		lbs.
O 246.	Garhwál (1868)	38
O 1367.	Gonda, Oudh	38

3. *T. tomentosa*, Roxb., Kurz ii. 297; Gamble 65. Vern. *Phusri*, Nep.; *Phane*, Lepcha.

A tree. Bark light brown, thin. Wood soft greyish-yellow with

an unpleasant odour when fresh cut. Pores small, uniformly distributed. Medullary rays fine, numerous. Annual rings marked by a faint line.

Himalaya, from Sirmur (Wallich) eastwards, common in the Sikhim Hills from 6,000 to 8,000 feet, South India and Burma

E 3374 Darjeeling, 6,000 ft

4. *T. angustifolia*, Wall. *T. saligna*, Nees. Vern. *Risapaing*, Beng.; *Shealuk*, Magh.

A large shrub. Bark brown, thin. Wood soft, light brown or nearly white. Pores moderate-sized, uniformly distributed.

Medullary rays short, fine to moderately broad.

H i . . . . . ion marked

E 3283. Runkheong Valley, Chittagong Hill Tracts.

E 717 (34 lbs) from . . . . . under the name of "*Hooria*," is not *Tetranthera* Wood rays short, broad

## 7. LITSÆA, Juss.

Contains, according to Meissner, about 8 species, but most of these have been latterly joined under one species, viz, *L. zeylanica*

Wood soft or moderately hard. Pores small, often in groups. Medullary rays fine, equidistant.

1. *L. zeylanica*, Nees; Beddome t. 294, Brandis 382. *L. foliosa*, Nees. *L. umbrosa*, Nees *L. scrobiculata*, Nees in DC Prodr. xv. Vern. *Chimdr*, *shalanglu*, *ranli*, *chikstu*, *charkhu*, *kaderu*, *narki*, *thirmai*, *zopru*, Pb; *Kanwal*, *tibora*, *sara*, *jhatela*, *chunara*, *chirchira*, Hind.; *Belori*, Burghers; *Dawal kûrûndû*, Cingh.

A moderate-sized evergreen tree. Wood reddish white, with darker heartwood, moderately hard. Annual rings distinctly marked by a stium of firmer wood on the outside of each ring, where the pores are often arranged in oblique lines. Pores small, uniformly distributed. Medullary rays fine, numerous.

North-West Himalaya, between 2,000 and 8,000 feet, Eastern Bengal, Burma and South India

Growth slow, 13 rings per inch of radius. Weight, 36 to 38 lbs per cubic foot. The wood is used for house building in South India. An oil is extracted from the fruit which is used for burning.

						lbs.
H	63	Nagkanda, Simla, 8,000 feet	.	.	.	36
H	3055	Mahasu, Simla, 7,000 feet	.	.	.	38

No 20 of Adrian Mendis' Ceylon Collection (51 lbs) marked *L. zeylanica*, of Ceylon, has a shining wood with the same structure, but more close grained than that of the tree of the North-West Himalaya

2. *L. consimilis*, Nees, Gamble 65. *L. zeylanica*, Nees, Brandis 382 (part) Vern. *Chirara*, *chir chirra*, Kumaun, *Pooteli*, Nep.

Kumaun, Nepal and Sikkim Himalaya between 4,000 and 9,000 feet. Khasia Hills.  
Burma.





A small evergreen tree with thin grey bark. Wood yellow, moderately hard, close-grained. Pores small, uniformly distributed. Medullary rays short, fine and moderately broad, the distance between the rays greater than the transverse diameter of the pores.

Himalaya from Simla eastwards.

Weight, 43 lbs. per cubic foot. A good wood. An oil is extracted from the fruit, and used for burning.

E 2420.	Hoom Linding, Darjeeling, 5,000 feet	. . . . .	lbs.
			43

3. *L. lanuginosa*, Nees; Brandis 382. Vern. *Kálban*, Pb.; *Kokra*, Hind.

A moderate-sized tree. Bark brown. Wood yellow, when fresh cut. Pores small, arranged in radial groups and oblique lines. Medullary rays short, fine, numerous.

Outer Himalaya, from the Indus eastwards up to 6,000 feet.

H 2948. Sutelj Valley, 3,000 feet.

## 8. DAPHNIDIUM, Nees.

Contains about 6 species. *D. bifarium*, Nees; Brandis 383, is an evergreen shrub or tree of the Himalaya from Kumaun eastwards. *D. venosum*, Meissn., is from Bhutan. *D. argenteum*, Kurz ii. 307, is a deciduous tree of the low and Eng forests of Pegu and Martaban, said by Kurz to have a yellowish close-grained wood. These three, with *D. elongatum*, form the section with penniveined leaves. The section, with tri-nerved leaves contains, besides *D. pulcherrimum*, *D. melastomaceum*, Nees, of Assam, the Khasia Hills and Sylhet, and *D. caudatum*, Nees, Kurz ii. 307, an evergreen tree of the Khasia Hills, Eastern Bengal and the hills of Martaban and Tenasserim above 4,000 feet.

1. *D. elongatum*, Nees; Gamble 65. Vern. *Paieli*, *pooalay*, *phusri*, Nep.; *Phamlet*, Lepcha.

A large evergreen tree. Wood yellow, turning olive grey on exposure, moderately hard, even-grained. Pores small, occasionally in groups, uniformly distributed. Annual rings marked by firmer wood on the outside of each ring. Medullary rays fine, uniform and equidistant; the distance between them slightly greater than the transverse diameter of the pores.

Sikkim and Bhutan Himalaya, from 6,000 to 8,000 feet, Khasia Hills.

Growth moderate to slow, 10 to 22 rings per inch of radius. Weight, 34 to 41 lbs. per cubic foot. A very pretty wood, worthy of attention. Wood used for building, chiefly planking.

E 362.	Rangbúl, Darjeeling, 7,000 feet	. . . . .	lbs.
E 2418.	" "	. . . . .	34
			41

2. *D. pulcherrimum*, Nees; Brandis 383; Kurz ii. 306; Gamble 65. Vern. *Dadia*, Hind.; *Sisi*, Nep.; *Nupsor*, Lepcha; *Dingpingwai*, Khasia.

A large evergreen tree with thin bark. Wood reddish white, moderately hard, even-grained. Structure similar to that of *D. elongatum*.

Kumaun, Nepal and Sikkim Himalaya between 4,000 and 9,000 feet, Khasia Hills, Burma.

and in the Bengal Forest  
 o 40 lbs per cubic foot.  
 The leaves are aromatic.

E 368	Rangbûl, Darjeeling, 7,000 feet	lbs
E 2417	" " " " " "	33
		40

### 3. *D. nov sp* Vein *Sillimber*, Nep.

A small evergreen tree. Wood grey, moderately hard. Annual rings marked by firmer tissue on the outside of each ring. Pores small, uniformly distributed. Medullary rays fine, uniform.

Higher Darjeeling Hills, above 9,000 feet

Growth slow, 18 rings per inch of radius Weight, 42 lbs

E 384.	Tonglo, Darjeeling, 10,000 feet	lbs.
		42

...ing, our speci-  
 ...ic foot, is the  
 ...very hard and  
 heavy, with the centre almost black. Pores moderate sized, often ruled with yellow resin. Medullary rays fine, uniform equidistant, the distance between the rays being equal to the transverse diameter of the pores. According to Laslett P = 1,000.

*Persea Nan muh*, Oliv, No. 3259, received from Japan by the kindness of Mr. G Takeda, is the "Nan muh" tree of which the expensive coffins used in China by wood is soft to moderately hard, with even-grained, of a dark olive brown. Pores small to moderate sized, uniformly on a longitudinal section. Medullary rings marked by a band of darker coloured

autumn wood

Weight, 34 to 35 lbs per cubic foot.

Nos E 1290 Vern *Dumbail*, 31 lbs., and E 1293 Vern *Raun dola*, 33 lbs., from Cachar, have the structure of *Lauraceæ*. The pores are larger than in *Beilschmiedia*, which they otherwise most resemble.

## ORDER LXXXVI. MYRISTICACEÆ.

### 1. MYRISTICA, Linn.

Contains about 12 to 14 species of Indian trees. Five species are found in Northern and Eastern Bengal, four in Burma, six in Bombay and South India, and four

in the Andamans. *M. moschata*, Willd.; Roxb. Fl. Ind. iii. 843. Vern. *Jaiphal* (nutmeg), *jati*, *jauntari* (mace), is the tree whose fruit gives the spices known as "nutmeg" and "mace," the former is the hard albumen and the latter the aril of the seed. The tree is cultivated in many parts of India, in Ceylon and in the Malay Archipelago. *M. elliptica*, Wall.; Kurz ii. 282, is an evergreen tree of the Andamans. *M. laurifolia*, Hook f. and Th., is a common large tree of the Western Ghâts and Ceylon. *M. Farquhariana*, Wall.; Beddome t. 270. Vern. *Pindi*, Kan., is a common tree of the evergreen forests of Kanara. *M. glabra*, Bl., is a tree of Sylhet. *M. amygdalina*, Wall.; Kurz ii. 283. Vern. *Toungsaga*, Burm., is an evergreen tree of Burma and the Andaman Islands. *M. longifolia*, Wall.; Kurz ii. 283; Gamble 67. (*M. liniifolia*, Roxb. Fl. Ind. iii. 847) Vern. *Gurmungban*, Magh; *Zadeip-hpo*, Burm., is an evergreen tree of Northern and Eastern Bengal and Burma. *M. erratica*, Hook. f. and Th., and *M. gibbosa*, Hook. f. and Th., are trees of the Khasia Hills. *M. attenuata*, Wall.; Beddome clxxvi., is a tall tree of the Concan Ghâts of Bombay. *M. corticosa* Hook. f. and Th.; Beddome t. 271; Kurz ii. 284; Gamble 68 (*M. angustifolia*, Roxb. Fl. Ind. iii. 847), is an evergreen tree of the forests of Northern and Eastern Bengal, Burma, South India and the Andaman Islands. *M. magnifica*, Beddome t. 268; Vern. *Ramanadike*, Kan., is a very large tree of Travancore.

1. *M. malabarica*, Lamk.; Beddome t. 269. Vern. *Kánagi*, Kan., *Pindi-kai* (seeds).

A small evergreen tree. Wood reddish grey, moderately hard. Annual rings (?) marked by concentric lines. Pores moderate-sized, oval, not numerous, uniformly distributed. Medullary rays fine, not prominent.

South Kanara and Malabar.

Weight, 32 lbs. per cubic foot. Wood used for building. The seeds give an oil which is used for burning and as an ointment for sores.

W 736. South Kanara	lbs.
	39

2. *M. Irya*, Gaertn.; Beddome clxxvi.; Kurz ii. 282. Vern. *Maloh*, Burm.; *Mutwindá*, *chooglum*, And.

A moderate-sized evergreen tree. Wood dark olive grey, hard, close-grained. Annual rings marked by distinct lines. Pores moderate-sized and large, oval and subdivided, uniformly distributed. Medullary rays numerous, very fine, wavy, bent outwards where they touch the pores, prominent on a radial section; the distance between the rays smaller than the transverse diameter of the pores.

Burma, Andaman Islands and Ceylon.

Weight, 52 lbs. per cubic foot. A handsome wood and worthy of attention; it seasons well and takes a good polish.

B 509. Andaman Islands	lbs.
	52

## ORDER LXXXVII. THYMELACEÆ.

Contains 6 Indian genera belonging to 2 tribes, viz.,—

Tribe I.—Thymeleæ . . . . . *Daphne*, *Edgeworthia*, *Wikströmia*, *Lasiosiphon* and *Linostoma*.

„ II.—Aquilarinæ . . . . . *Aquilaria*.

*Edgeworthia Gardneri*, Meissn.; Brandis 386; Gamble 67. Vern. *Kaghuti*, *aryili*, Nep., is a large shrub of Nepal, Sikkim and Bhutan, from 4,000 to 7,000 feet, with a white, thick, fibrous bark. Wood grey, light, soft with little lustre. It is the chief species used in the manufacture of the Nepal paper, and it gives the whitest

kind The paper is very tough, and large quantities are made in Nepal and Sikkim *Walstromia virgata*, Meissn., Beddome clixviii, Brandis 386 Vern *Bhatnigi*, *thlak*, Pb, *Chamla*, Kumaun, is a small shrub of the Himalaya from the Indus eastwards the Khasi Hills and Ceylon, between 5,000 and 7,000 feet An inferior sort of paper and rope is made of its bark in Kumaun *Lasiophon eriocephalus*, Dene, Beddome clixix Vern *Naka*, Cingh is a large shrub of Bengal and South India A fibre is obtained from its bark, which is, besides, used for poisoning fish in Ceylon *Linostoma* contains 4 species *L. pauciflorum*, Griff, Kurz ii 334, is an evergreen shrub of the Martaban Hills at 3,000 to 4,000 feet, *L. decandrum*, Wall, Kurz ii 334, a shrub of Chittagong, *L. scandens*, Kurz ii 334, a shrub of Tenasserim, and *L. namense*, Kurz ii 335 a shrub of the Eng forests of Prome *Gyrinops Walla*, Gaertn, Beddome t 303 Vern *Walla*, Cingh, is a handsome small tree found in Ceylon *Lagetta lintearia*, Lamk is the Lacebark tree of Jamaica, whose liber is made into cloth, paper, lace, ropes, whips and other articles

## 1. DAPHNE, Linn

Contains about 7 species *D. cachemiriana*, Meissn., from the Pirpanjal, and *D. oleoides*, Schreber, are described by Brandis, p 385, under *D. mucronata* *D. pendula* Sm, Kurz ii 333, is an evergreen shrub of the Martaban Hills at 5,000 to 6,000 feet elevation *D. Wallichii*, Meissn Vern *Chhota aryls*, Nep, and *D. longifolia*, Meissn Vern *Shedbarua*, Nep, are shrubs of the Eastern Himalaya, Khasia Hills and Eastern Bengal, whose bark is used in the manufacture of paper, the latter species yielding the commoner coarse kind *D. Mezereum*, Linn, the "Mezereum" with deciduous leaves, and *D. Laureola*, Linn, the "Spurge Laurel," with evergreen leaves, are well-known European shrubs

Pores very small, arranged in oblique tails or irregular patches (*D. Mezereum*) Medullary rays fine or very fine.

1. *D. mucronata*, Royle, Brandis 384. Vern. *Laghine*, Afg.; *Pech*, Sind; *Katilal*, *Kanthan*, *gandalun*, *shalangri*, *zoshu*, *shing*, *maskur*, *swana*, *jikri*, *dona*, *channi niggi*, *kagsari*, *sind*, *kansan*, *sondi*, Pb.

A small evergreen shrub. Wood white, soft. Pores very small and extremely small, arranged in oblique tails. Medullary rays numerous, very fine. Numerous faint concentric lines across the rays.

to 9,000 feet

The bark and leaves  
to cause nausea and

H 2826 Cheog Forest, Simla, 7,000 feet.

H 2828 Simla, 7,000 feet

2. *D. papyracea*, Wall.; Brandis 386; Gamble 67. Vern. *Niggi*, Pb, *Set barwa*, *salpura*, Hind.; *Balwa*, Kumaun, *Gande*, *kaghuti*, Nep., *Dayshing*, Bhutia.

A large shrub. Bark grey, smooth, liber well developed and yielding a very strong fibre which is used for the manufacture of ropes and paper Wood white, moderately hard. Pores extremely small in long narrow oblique and bending tails of soft tissue. Medullary rays fine, numerous.

Himalaya from near the Indus to Bhutan, between 3,000 and 9,000 feet, Khasia Hills

Growth moderate, 9 rings per inch of radius Weight, 34 lbs per cubic foot. Flowers very sweet scented Bark used to make Nepal and Bhutia paper, the commoner thin kind, also to make ropes for various purposes such as carrying loads

E 2408 Darjeeling, 7,000 feet . . . . .

the  
34

## 2. AQUILARIA, Lam.

Two species only of this genus are known from India, viz., *A. Agallocha*, here described, and *A. malaccensis*, Lamk.; Kurz ii. 336, from Tenasserim, which, according to Meissner, is the "Garode Malacca" or Malacca Eaglewood. There is still some doubt about the identification of the species of *Aquilaria* which yields the Eaglewood of commerce. Roxburgh says the *A. Agallocha* is an immense tree, a native of the mountains east and south-east of Sylhet between 24° and 25° north latitude. "There can be little doubt that this is the tree which furnishes the real Calambac or Agallochum of the ancients, and there seems more reason to think that it was carried to China from our eastern frontier than to suppose it was carried from Cochin China or any other country in the vicinity of China, where it has always been in great demand. Small quantities are sometimes imported into Calcutta by sea from the eastward; but such is always deemed inferior to that of Sylhet." Kurz seems to consider the Sylhet and the Tenasserim tree as the same species, and as the structure of the wood of both is identical, there is a strong probability of his view being correct. Further investigation, however, is necessary to ascertain if the species described by Roxburgh as growing in Assam and Sylhet (*A. Agallocha*) is identical with the tree furnishing the *Akyau* wood of Burma. As far as our account is concerned, we shall only speak of one species.

1. *A. Agallocha*, Roxb. Fl. Ind. 422; Brandis 387; Kurz ii. 335. Lign Aloes or Eaglewood. Vern. *Ugûr*, Hind., Beng.; *Sasi*, Ass.; *Akyau*, Burm.; *Kayu garu*, Malay; *Nwahmi*, Siam; *Nyaw-chah*, Chinese; *Kihay*, *sinnah*, Cingh.

A large evergreen tree. Wood white, soft, even-grained, scented when fresh cut. In the interior of old trees are found irregular masses of harder and darker coloured wood, which constitute the famous Eaglewood of commerce, called *Kaya garu* by the Malays, and *Akyau* by the Burmese. Pores small and moderate-sized, in short radial lines. Medullary rays fine, numerous; the distance between two consecutive rays less than the transverse diameter of the pores. Numerous short transverse bands of pores and intercellular ducts filled with a brownish substance.

Eastern Bengal, Burma, Malay Peninsula and Archipelago.

Growth moderate, 8 rings per inch of radius. Weight, Kyd gives 20 lbs.; our specimen 25 lbs. per cubic foot. Kyd gives  $P = 203$ . A description of Eaglewood and its method of collection is given in extracts from Mr. Lee's reports given at p. 80 of the Burma Forest Report for 1875-76, and at p. 19 of the Burma Forest Report for 1876-77. From these it appears that the *Akyau* is the most important forest produce of the forests of South Tenasserim and the Mergui Archipelago. It is found in fragments of various shapes and sizes in the centre of the tree, and usually, if not always, where some former injury has been received. To collect it the trees are felled and allowed to rot for about three years in the forest, when they are again visited, the tree cut into fragments, and the odoriferous wood cut out. Mr. Lee says that most usually the *Akyau* is found in the sapwood.

E 951.	Golaghât, Assam	. . . . .	lbs.
B 1948.	Tavoy	. . . . .	24
B 2485.	"	. . . . .	23
		. . . . .	29

## ORDER LXXXVIII. ELÆAGNEÆ.

Contains 2 genera only, *Elæagnus* and *Hippophaë*.

Pores small and moderate-sized. Annual rings distinctly marked by a belt of larger pores. *Hippophaë* has numerous uniform and fine medullary rays, while *Elæagnus* has short rays of different width, which in some species are broad.

## 1. HIPPOPHAE, Linn.

thence eastwards to Bhutan

1. *H. rhamnoides*, Linn., Brandis 388. Vern. *Tarap, tsarma, sirma, tsuk, taru, niehak, tsekar, tsermang*, Ladak, Piti and Lahoul.

A large thorny shrub, sometimes a small tree. Bark grey, rough, with vertical furrows. Heartwood yellowish brown, mottled, moderately hard, close-grained. Annual rings distinctly marked by the inner or spring wood being porous and mainly composed of numerous moderate-sized pores, the outer or autumn wood being more compact, with fewer and smaller pores. Medullary rays numerous, very fine, equidistant. The wood of the shrub from Lahoul has the same structure as the European one.

Inner tract of the North-West Himalaya, chiefly in moist, gravelly stream beds, from 5 000 to 10,000 feet

Growth fast, 5 r  
to Mathura, Fl For  
dry branches for b  
Inner Himalaya.  
leaves are covered with silvery scales

H 135	Lahoul, 10,000 feet	44
H 3063	Kunawar, 8,000 "	...

## 2. ELÆAGNUS, Linn.

Wall, *P. aquatifolia*,  
P. is a medium-sized  
Medullary rays 1 or 2  
25 feet with an old,  
Bark thick,  
dark brown  
Sapwood narrow; heartwood dark brown, porous and soft. Medullary rays 1 or 2  
Wood used for fuel. It gives a transparent gum. The fruit is eaten, and is  
Yarned a spirit is distilled from it. It is used, according to H. B. K.  
For p. 245, 251a to 411a. *Elæagnus* is a genus of plants. *Elæagnus*, Benth.  
Fl Ind. 441, Brandis 20. *Elæagnus* is a genus of plants. *Elæagnus*, Benth.  
is an evergreen tree of Nepal, the Eastern Himalaya, G. H. and A. Benth.

1. *E. latifolia*, Linn.; *Buddleia elæagnus*; Brandis 219; *Gardner* 61.  
*E. conferta*, Roxb. Fl Ind. 441; Kurz n. 231. Vern. *Gharlin*,  
*nijalis*, Kumaon; *Jaria*, Nep.; *Gara*, B. 2.; *Karling*, M. 1.

A shrubby evergreen tree or small tree. Wood is hard, dense,  
Pores are large and small, irregular, scattered, but not  
even, do not appear to be annual rings, between the large the pores are  
small and sandy. Medullary rays 1 or 2.

Himala, from Kumaon to Nepal, from 5000 to 10,000 feet  
Ind.

Vern. *Gharlin* or *Gharlin*. *Elæagnus*; it is not a species of *Elæagnus*.  
Buddleia is a genus of plants.

E 327	Elæagnus latifolia	44
		45

2. AQUILARIA, Lam.

Two species only of this genus are known from India, viz., *A. Agallocha*, here described, and *A. malaccensis*, Lamk.; Kurz ii. 336, from Tenasserim, which, according to Meissner, is the "Garo de Malacca" or Malacca Eaglewood. There is still some doubt about the identification of the species of *Aquilaria* which yields the Eaglewood of commerce. Roxburgh says the *A. Agallocha* is an immense tree, a native of the mountains east and south-east of Sylhet between 24° and 25° north latitude. "There can be little doubt that this is the tree which furnishes the real Calambac or Agallochum of the ancients, and there seems more reason to think that it was carried to China from our eastern frontier than to suppose it was carried from Cochin China or any other country in the vicinity of China, where it has always been in great demand. Small quantities are sometimes imported into Calcutta by sea from the eastward; but such is always deemed inferior to that of Sylhet." Kurz seems to consider the Sylhet and the Tenasserim tree as the same species, and as the structure of the wood of both is identical, there is a strong probability of his view being correct. Further investigation, however, is necessary to ascertain if the species described by Roxburgh as growing in Assam and Sylhet (*A. Agallocha*) is identical with the tree furnishing the *Akyau* wood of Burma. As far as our account is concerned, we shall only speak of one species.

1. *A. Agallocha*, Roxb. Fl. Ind. 422; Brandis 387; Kurz ii. 335. Lign Aloes or Eaglewood. Vern. *Ugúr*, Hind., Beng.; *Sasi*, Ass.; *Akyau*, Burm.; *Kayu garu*, Malay; *Nwahmi*, Siam; *Nyaw-chah*, Chinese; *Kihay*, *sinnah*, Cingh.

A large evergreen tree. Wood white, soft, even-grained, scented when fresh cut. In the interior of old trees are found irregular masses of harder and darker coloured wood, which constitute the famous Eaglewood of commerce, called *Kaya garu* by the Malays, and *Akyau* by the Burmese. Pores small and moderate-sized, in short radial lines. Medullary rays fine, numerous; the distance between two consecutive rays less than the transverse diameter of the pores. Numerous short transverse bands of pores and intercellular ducts filled with a brownish substance.

Eastern Bengal, Burma, Malay Peninsula and Archipelago.  
Growth moderate, 8 rings per inch of radius. Weight, Kyd gives 20 lbs.; our specimen 25 lbs. per cubic foot. Kyd gives  $P = 203$ . A description of Eaglewood and its method of collection is given in extracts from Mr. Lee's reports given at p. 80 of the Burma Forest Report for 1875-76, and at p. 19 of the Burma Forest Report for 1876-77. From these it appears that the *Akyau* is the most important forest produce of the forests of South Tenasserim and the Mergui Archipelago. It is found in fragments of various shapes and sizes in the centre of the tree, and usually, if not always, where some former injury has been received. To collect it the trees are felled and allowed to rot for about three years in the forest, when they are again visited, the tree cut into fragments, and the odoriferous wood cut out. Mr. Lee says that most usually the *Akyau* is found in the sapwood.

E 951.	Golaghát, Assam	lbs.
B 1948.	Tavoy	24
B 2485.	"	23
		29

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Contains 2 genera only, *Elæagnus* and *Hippophaë*.  
Pores small and moderate-sized. Annual rings distinctly marked by a belt of larger pores. *Hippophaë* has numerous uniform and fine medullary rays, while *Elæagnus* has short rays of different width, which in some species are broad.

## 1 HIPPOPHAE, Linn

le  
S  
te  
thence eastwards to Bhutan

the scales or hairs on the under surface of the  
Vern *Ashuk* Nep *Dur chuk* Kumaun,  
under surface of the leaves having a dense  
found in the Upper Sutlej Valley and from

1. *H. rhamnoides*, Linn, Brandis 388 Vern *Tsarap*, *tsarma*, *sirma*,  
*tsuk*, *taru*, *niechak*, *tseikar*, *tsermang*, Ladak, Piti and Lahoul

A large thorny shrub, sometimes a small tree Bark grey, rough,  
with vertical furrows Heartwood yellowish brown, mottled, moderately  
hard, close grained Annual rings distinctly marked by the inner or  
spring wood being porous and mainly composed of numerous moderate-  
sized pores, the outer or autumn wood being more compact, with fewer  
and smaller pores Medullary rays numerous, very fine, equidistant  
The wood of the shrub from Lahoul has the same structure as the  
European one

Inner tract of the North West Himalaya chiefly in moist gravelly stream beds,  
from 5 000 to 10 000 feet

Growth fast 5 rings per inch of radius Weight 44 lbs per cubic foot according  
to Mathien Fl For p 245 39 lbs to 54 lbs It is used for fuel and charcoal and the  
dry branches for hedges It is very valuable in the dry almost treeless tracts of the  
Inner Himalaya The fruit is eaten but is very acid, it is made into a preserve The  
leaves are covered with silvery scales

lbs  
44

H 135 Lahoul 10 000 feet  
H 3063 Kunawar, 8 000

## 2 ELÆAGNUS, Linn

1

andsome crown Bark thick,  
rugged dark brown furrows

Medullary rays numerous

It gives a transparent gum The fruit is eaten and in  
Yarkand a spirit is distilled from it It weighs according to Mathien Fl  
For p 245 36 lbs to 41 lbs per cubic foot It is often planted *F arborea* Roxb  
Fl Ind 1 441, Brandis 390 Kurz n 331 Vern *Sheashong* Garo *Mingu* Barm,  
is an evergreen tree of Nepal the Eastern Himalaya Garo Hills and Burma

1 *E latifolia*, Linn, Beddome clxxx, Brandis 390, Gumble 67  
*E conferta* Roxb Fl Ind 1 440, Kurz n 331 Vern *Ghimain*,  
*mihaula*, Kumaun, *Jarsila*, Nep, *Guara*, Beng, *Kamhoong*, Magh

A straggling evergreen shrub or small tree Wood white, soft  
Pores moderate sized and small, in irregular, concentric belts, which, how-  
ever, do not appear to be annual rings, between the belts the pores are  
smaller and scanty Medullary rays fine and broad

Himalaya from Kumaun to Bhutan Khasia Hills, Eastern Bengal and South  
India

Weight 40 lbs per cubic foot Fruit eaten, it is acid and somewhat astringent  
Beddome says it makes good tarts

E 2107 Tukdah Darjeeling 5 000 feet

lbs  
45



2. *E. umbellata*, Thunberg; Brandis 390. Vern. *Ghiwāin*, *ghain*, *kankoli*, *bammewa*, Pb.

A thorny, deciduous shrub, with silvery grey leaves. Bark grey. Wood white, hard, even-grained, warps in seasoning. Annual rings distinctly marked by a narrow continuous belt of moderate-sized pores; in the rest of the wood the pores are very small and uniformly distributed, but occasionally intermediate bands of larger pores are found. Medullary rays short, fine and broad.

Himalaya, from near the Indus to Bhutan, between 3,000 and 10,000 feet.

Growth moderate, 10 rings per inch of radius. Weight, 45 lbs. per cubic foot. The fruit is eaten.

H 71.	Mashobra, Simla, 7,000 feet . . . . .	lbs. 45
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## ORDER LXXXIX. PROTEACEÆ.

A large Order of plants, chiefly Australian and South African, containing only one Indian genus, *Helicia*. Many of the species are cultivated on account of the beauty of their flowers or foliage; such are the species of *Hakea*, *Banksia* and *Grevillea*, the best known of which is *Grevillea robusta*, the 'Silk Oak,' a large tree of New South Wales, which has become quite established in gardens in Bengal and South India. It grows well in Calcutta, where a fine avenue of it may be seen at the Botanic Gardens.

Pores in concentric bands. Medullary rays very broad and prominent.

### 1. *HELICIA*, Lour.

Contains about 7 Indian species. *H. Cochín-Chinensis*, Lour.; Kurz ii. 311; Gamble 66, is an evergreen tree of the hills of Sikkim, Assam, and Martaban in Burma. *H. excelsa*, Bl.; Kurz ii. 312 (*Rhopala excelsa*; Roxb. Fl. Ind. i. 362), is a large tree of Chittagong and Tenasserim. *H. nilagirica*, Beddome clxxviii., is a shrub of the western slopes of the Nilgiris at an elevation of 3,000 to 4,000 feet. *H. pyrrobotrya*, Kurz ii. 312, is a tree of the Martaban Hills. *H. salicifolia*, Presl.; Kurz ii. 312, is a tree of Tenasserim; and *H. attenuata*, Bl. (*Rhopala moluccana*, Roxb. Fl. Ind. i. 364), a tree of the Khasia Hills.

1. *H. robusta*, Wall.; Beddome t. 301; Kurz ii. 311; Gamble 66. Vern. *Jowee*, Sylhet; *Tegala mugu*, Kan.; *Doukya beng*, Burm.

A small evergreen tree. Bark grey,  $\frac{1}{4}$  inch thick. Wood pinkish grey, moderately hard. Pores small, in numerous, narrow concentric bands of softer tissue, interrupted by the broad and very broad medullary rays, which are prominent on a radial section.

Hills of Bengal, Burma, and Southern India.

Weight, 44 lbs. per cubic foot. Has very pretty flowers.

E 2409.	Sumbong, Darjeeling, 2,000 feet . . . . .	lbs. 44
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*Grevillea robusta* has a rough bark, 3-16ths inch thick. Wood hard, light reddish brown, sapwood greyish white. Pores moderate-sized, scanty, in concentric patches of white tissue. These concentric patches are interrupted by the medullary rays and bend outward where they meet the rays, so that the concentric bands have a wavy outline. Medullary rays broad and very broad, very prominent on a radial section, showing a beautiful silver grain. The heartwood seems durable, but the sapwood decays quickly. It would be a handsome furniture wood. (O 3263, Saharanpur.)



1. *L. vestitus*, Wall.; Brandis 396. Vern. *Pand*, Hind.

A parasitic shrub. Wood reddish white, compact, close-grained, moderately hard. Pores very small, arranged in rounded groups or patches, which are uniformly distributed. Medullary rays short, fine to broad; the distance between the rays several times larger than the transverse diameter of the pores.

North-West Himalaya from the Ravi to Sikkim up to 7,000 feet, Khasia Hills. Growth slow, about 14 rings per inch of radius. Weight, 51 lbs. per cubic foot. It grows often to a large size, and is extremely common in some parts of the Himalaya, especially on the Oaks, *Q. incana* and *Q. dilatata*. It is also found on *Odina*, *Schleichera*, *Randia*, *Machilus* and other trees.

H 3033.	Theog, Simla, 7,000 feet (on <i>Q. dilatata</i> )	.	.	.	lbs.
H 2938.	Below Naldehra, Simla, 5,000 feet (on <i>Q. incana</i> )	.	.	.	51

2. *L. longiflorus*, Desr.; Brandis 397; Kurz ii. 321; Gamble 66. *L. bicolor*, Roxb. Fl. Ind. i. 548. Vern. *Pand*, *amúl*, Pb.; *Bánda*, C. P.; *Patha*, Banda; *Bara manda*, Beng.; *Proosti*, Lepcha; *Ajeru*, Nep.; *Yelinga wadinika*, Tel.; *Kaurak*, Bhíl.

A parasitical shrub. Wood reddish, moderately hard. Pores very small, very numerous. Medullary rays short, fine to very broad.

Outer Himalaya from the Jhelam eastwards, ascending to 7,500 feet, Bengal, Central and South India, Burma, Andaman Islands and Ceylon.

The commonest species. It has large, handsome, scarlet flowers. It grows on most trees; in North India on *Melia*, *Bauhinia*, *Albizia*, *Mallotus*, the Mango, Peach and Pear; in Oudh on *Bassia*, *Buchanania*, *Diospyros*; in Sikkim on *Sál* and *Albizia*; in the North-West Himalaya on Oak.

H 3061. Koti, Simla, 6,000 feet (on *Q. dilatata*).

## ORDER XCI. SANTALACEÆ.

Contains 4 genera of Indian trees or shrubs: viz.—*Pyrularia*, *Henslowia*, *Osyris* and *Santalum*.

*Henslowia heterantha*, Hook. f.; Kurz ii. 328; Gamble 67. Vern. *Ajeru*, Nep., is a large mistletoe-like shrub, sometimes parasitic, sometimes terrestrial, of the North-East Himalaya and the hills of Martaban. *Osyris arborea*, Wall.; Beddome cxxxii.; Brandis 399 (*O. Wightiana*, Wall.) Vern. *Bakardharra*, *bakarja*, Kumaun; *Popli*, Belgaum; *Jhuri*, Nep., is a shrub of the Himalaya from Simla to Bhutan ascending to 7,000 feet, Western Gháts and Ceylon, said by Aikin in Wallich's List to have a red-brown, hard, compact and fine-grained wood.

### 1. PYRULARIA, Mich.

Contains 2 species. *P. Wallichiana*, Meissn.; Beddome t. 304. Vern. *Benduga*, Kan., is a small tree of Coorg, the Wynaad and Ceylon, with a light-coloured, curiously-grained wood.

1. *P. edulis*, A. DC.; Gamble 66. Vern. *Amphi*, Nep.; *Safhyi*, Lepcha.

A small or moderate-sized thorny tree. Bark thin, grey. Wood white, moderately hard, close-grained. Pores small and very small, in oblique bands of softer tissue. Medullary rays fine and broad, numerous, prominently reticulated on a radial section.

Natal Station and the Khasa Hills from 4000 to 5000 feet.  
Growth moderate about 8 rings per inch of radius. Wood 24 to 30% per inch of  
foot. Wood used by Europeans for botanical implements. Fruit eaten.

E 240. Takkil, Puzhassery, 5000 feet	:	:	:	:	:	24
E 600. Puzhassery, 7000 feet	:	:	:	:	:	30

## 2. SANTALUM. Linn.

1. *S. album*, Linn.; Roxb. Fl. Ind. i. 442; Boddeme & 256; Brande 390; Kurz ii. 329. Sandalwood. Vern. *Chandan*, *chandal*, *sandal*, Hind.; *Gozila*, Kan.; *Sar-ta-ia*, Burm.

A small ever-green tree, rarely exceed 24 feet in girth and 30 feet in height. Bark dark grey, inner black, rough, with short vertical cracks, inner substance dark red. Sapwood white, scentless, heartwood yellowish brown, strongly scented, very hard, very close-grained and oily. Annual rings distinctly marked by more numerous and slightly larger pores in the spring wood. Pores small, circular, numerous. Medullary rays short, fine, numerous, uniform and equidistant.

Dry region of South India. It grows naturally in the dense parts of Mysore, Coimbatore and Salem districts, extending south to Madras and north to Kolhapur, generally at an elevation of from 2000 to 3000 feet, in poor soils and seeking the protection of badamons and scrub jungles.

Regarding the rate of growth, not much information is available. The specimens in our collection show a growth of 5 to 7 rings per inch of radius. A tree in the Saharanpur Botanic Gardens, said to be 86 years old, measured 3 feet 4 inches in girth, giving 5.6 rings per inch of radius.

In Colonel Boddeme's report on the forests of Northern Coimbatore, July 1876, the following data are given—

		Age	Height	Girth
Talle Mally Plantation commenced 1863-64	Trees in unfavourable locality	14	5 to 6 feet	3 to 4 inches
	Trees in favourable locality	14	30	15
Brlur Plantation commenced 1870	Planted 1870	6	10 to 15 "	8 to
	" 1872	4	7 to 8 "	5 to

The first of these gives 25, the rest 6, 4 and 3.5 rings per inch of radius respectively.

In his report of the 3rd March 1877 on the Salem forests, Colonel Boddeme that the largest of 3 sandal trees which were growing under shade in favourable positions in the Denkimootish plantation on the Mailgherry hills had a height of 16 feet a girth of 8 inches. As the trees were planted in 1874 and were consequently years old at the time of measurement, their growth has been very fast.

Again, in his report on plantations and fuel reserves of 29th May 1878, Colonel Boddeme gives the following average measurements of trees in different plantations—

	Age	Height	Girth	
1 North Coimbatore, Talle Mally Plantation, 3000 feet altitude	14 years	30 feet	15 in.	{ Not only where there is shade
2 North Coimbatore, Brlur Plantation, 3200 feet altitude	17 "	8 to 15 "	8 to 11 "	
3 Nilgiris, Segur Plantation, 3000 feet altitude	6 "	12 to 15 "	6 to 8 "	

or 6, 4.5 and 4.5 rings per inch of radius respectively.

In this plantation Colonel Boddeme expects a yield per acre, when the plantation is mature, in 25 years, of at least 150 maunds of heartwood. There are 23 acres with about 21,000 trees. The growth in the Coimbatore plantations varies from 2 to 6 rings per inch, averaging 4.5 rings, but the locality in each case was favourable.

1. *L. vestitus*, Wall.; Brandis 396. Vern. *Pand*, Hind.

A parasitic shrub. Wood reddish white, compact, close-grained, moderately hard. Pores very small, arranged in rounded groups or patches, which are uniformly distributed. Medullary rays short, fine to broad; the distance between the rays several times larger than the transverse diameter of the pores.

North-West Himalaya from the Ravi to Sikkim up to 7,000 feet, Khasia Hills.

Growth slow, about 14 rings per inch of radius. Weight, 51 lbs. per cubic foot. It grows often to a large size, and is extremely common in some parts of the Himalaya, especially on the Oaks, *Q. incana* and *Q. dilatata*. It is also found on *Odina*, *Schleichera*, *Randia*, *Machilus* and other trees.

Nepal Sikkim and the Khasia Hills from 4 000 to 5 000 feet

Growth moderate about 8 rings per inch of radius Weight 47 to 50 lbs per cubic foot Wood used by Bhutias for butter making implements Fruit eaten

E 2406 Tukdah Darjeeling 5 000 feet  
E 698 Rangbul Darjeeling 7 000 feet

lbs  
47  
50

## 2 SANTALUM, Linn

1 *S album*, Linn, Roxb Fl Ind 1 442, Beddome t 256, Brandis 398, Kunz n 329 Sandalwood Vern *Chandan, chandal, sandal*, Hind , *Gandha*, Kan , *San ta ku* Burm

A small evergreen tree rarely exceeding 4 feet in girth and 30 feet in height Bark dark grey, nearly black, rough, with short vertical cracks, inner substance dark red Sapwood white, scentless, heartwood yellowish brown, strongly scented, very hard, very close grained and oily Annual rings distinctly marked by more numerous and slightly larger pores in the spring wood Pores small, circular, numerous Medullary rays short, fine, numerous, uniform and equidistant

Dry region of South India It grows naturally in the drier parts of Mysore Madura and north to Kolhapur in poor soils and seeking the

T

giving 5 6 rings per inch of radius

In Colonel Beddome's report on the forests of Northern Coimbatore July 1876 the following data are given —

		Age	Height	Girth
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	Trees in favourable locality	14	30	15
Bylur Plantation commenced 1870	Planted 1870	6	10 to 15	8 to 11
	1872	4	7 to 8	5 to 9 ,

The first of these gives 25 the rest 6 4 and 3 5 rings per inch of radius respectively

Talle Mally Plantation commenced 1863 64 Bylur Plantation commenced 1870

years old at the time of measurement their growth has been very fast

Again in his report on plantations and fuel reserves of 28th May 1878 Colonel Beddome gives the following average measurements of trees in different plantations—

	Age	Height	Girth	
1 North Coimbatore Talle Mally Plantation 3 000 feet altitude	14 years	30 feet	15 in.	{ But only where there is shade
2 North Coimbatore Bylur Plantation 3 200 feet altitude	7 4	8 to 15 8 to 8	8 to 11 5 to 6	
3 Nilgiris Segur Plantation 3 000 feet altitude	6	12 to 10		

or 6 4 5 and 4 5 rings per inch of radius respectively

plantation  
s with  
2 to 6

In an article in the "Indian Forester" for April 1878, Vol. iii., No. 4, entitled "Notes on Sandal," 8 trees or groups of trees in Mysore are mentioned, of whose approximate age there is some evidence. In some cases the girth was taken at the base; in others the mean girth is given.

The following are the measurements given in that paper:—

No. of trees.	Place.	Age (probable).	Girth.	No. of rings of radius.	Height of bole.	Total height.	
		Years.	Inches.		Feet.	Feet.	
1	Mudagerri . . .	55	20	17	9	...	Mean girth.
1	" . . .	41	27	10	12	50	Girth at base.
1	" . . .	43	35	8	...	17	Ditto.
1	" . . .	61	49	9	...	30	Ditto.
1	Ijapûr . . .	45	40	7	...	30	Mean girth.
1	" . . .	30	40	5	5	...	Ditto.
1	Bobagalli . . .	93	27	11	20	...	Girth at base.
7	" . . .	75	33	7	...	27½	Girth at 6 feet.

These measurements give an average of 9·2 rings per inch of radius. It will be seen that no approximately correct generalisation as to the usual rate of growth can be obtained. In good conditions it seems probable that 5 to 6 rings per inch is about the average rate, while in unfavourable places the average growth cannot be taken at much less than 10 rings per inch.

The weight of sandalwood is given by Fowke at 55 lbs.; by Skinner, No. 113, at 58 lbs.; our specimens average 61·5 lbs. per cubic foot. Fowke gives  $P=878$ ; Skinner 874. The heartwood is used for carving, for incense and perfume. It is an important article of trade in India, and is largely exported to China and Arabia. It has been found to be well suited for engraving. Sandalwood oil is distilled from the wood.

It is chiefly spread through the agency of birds, and comes up in hedges and under the shade of shrubs. It is very impatient of mutilation, is difficult to transplant, and suffers greatly from wounds in the bark. Plantations of sandal have been established in Mysore and Madras.

	lbs.
E 2489. Botanic Gardens, Calcutta (from a tree which was blown down in the Cyclone of 1864)	56
D 1209. Mysore . . . . .	71
D 2307. " . . . . .	60
D 3140. " . . . . .	60
D 1360. Salem, Madras . . . . .	61
No. 41. Salem Collection . . . . .	61

B 1950, 62 lbs., was sent from Tavoy under the name of *Kalamet*. The specimen is evidently very old, of a brown colour, like that of the heartwood of sandal, and in structure it differs only in having more prominent medullary rays, which are broader than in sandal, uniform and equidistant. The wood is scented, resembling that of sandalwood, and it may possibly be another species of *Santalum*.

## ORDER XCII. URTICACEÆ.

A large Order remarkable for many useful products, chiefly fibres, given by species belonging to it. The chief fibrous plants are the nettles, the 'Rhea,' the 'Puya,' the Paper Mulberry, *Antiaris* and *Sponia*. Fruits are given by the mulberries, figs and





*Dorstenia Griffithiana*, Kurz ii. 462, is an evergreen low shrub of Tenasserim.

*Conocephalus suaveolens*, Bl.; Kurz ii. 430; Gamble 77, is a large climber of Northern and Eastern Bengal and Burma.

*Cudrania javanensis*, Trecul; Brandis 425; Gamble 73 (*Cudranus Rumphii*, Thw.; Beddome cexx., *C. amboinensis*, Rumph.; Kurz ii. 434) Vern. *Manda, mandei, kangu*, Hind., is a straggling shrub of the Sub-Himalayan tract, Eastern Bengal and Ceylon. The bark is yellowish brown, smooth, and the wood used for fuel. *C. fruticosa*, Wight, and *C. frutescens*, Trecul; Kurz ii. 434, 435, are scandent Burmese shrubs.

*Girronniera* contains 4 to 5 trees. *G. reticulata*, Thw.; Beddome t. 313 (*G. cuspidata*, Planch.; Kurz ii. 470), is a large tree of the Western Gháts and Burma, said to have a valuable timber. *G. nervosa*, Planch.; Kurz ii. 469, is a large tree of Chittagong and Burma. *G. lucida*, Kurz ii. 470, is a tree of the Andaman Islands; and *G. Thomsoni*, King; Gamble 73, a large tree of the Sikkim hills.

As regards structure, the following three types may be distinguished:—

1st.—*Artocarpus* type. Distinct dark-coloured heartwood (excepting *Antiaris*, *Sponia*, *Debregeasia* and *Pouzolzia*). Pores isolated, sometimes in groups, but not in concentric or oblique lines; sometimes enclosed in a ring. The species of a temperate climate have annual rings, which are generally marked by a belt of larger pores. To this belong the arborescent Urticæ, *Böhméria*, *Pouzolzia*, and *Debregeasia*; of Moreæ, *Morus* and *Broussonetia*; of Artocarpeæ, *Antiaris* and *Artocarpus*; and of Ulmæ, *Sponia*.

2nd.—*Ulmus* type. Pores united by concentric narrow bands of softer texture; in the temperate species the annual rings are marked by a porous belt of large pores. To this belong: of Ulmaceæ, *Celtis* and *Ulmus*.

3rd.—*Ficus* type. Wood soft, no heartwood, consisting of alternate bands of soft and firm texture, the small or moderate-sized pores being generally included in the former. To this belong: of Moreæ, *Streblus*; and of Artocarpeæ, *Ficus*.

The only character which the species of the Order Urticaceæ may be said to have in common is that the medullary rays are prominent, fine, rarely moderately broad.

## 1. BÖHMERIA, Jacq.

Contains about 10 to 12 species. *B. macrophylla*, Don; Brandis 403; Kurz ii. 424; Gamble 76. Vern. *Saochála, golka*, Kumaun; *Kamli*, Nep., is a handsome long-leaved shrub of the outer Himalaya from Kumaun eastwards up to 4,000 feet, and the Khasia Hills. It gives a good fibre, used to make ropes and fishing lines. *B. travancorica*, Beddome cexxv., is a small tree of the Wynaad, South Kanara Gháts and Travancore hills up to 4,500 feet. *B. malabarica*, Wedd.; Kurz ii. 422; Gamble 76. Vern. *Takbret*, Lepcha; and *B. Hamiltoniana*, Wedd.; Kurz ii. 424; Gamble 76. Vern. *Taksur*, Lepcha; *Kanaitseik*, Magh; *Sapsha*, Burm., are common undershrubs which give a strong fibre. The first is found in the moister zones of India and Burma, the second in Northern and Eastern Bengal and Burma. *B. nivea*, Hook. and Arn.; Brandis 402 (*Urtica tenacissima*, Roxb. Fl. Ind. iii. 590), is the "China Grass" or "Rhea" plant, cultivated in Assam, Bengal and parts of North-West India for its fibre, which is one of the finest produced in the world. It is a finer fibre than jute, and the plant would be still more largely grown and exported were it not for its requiring a richer soil, and being more difficult of preparation.

1. *B. rugulosa*, Wedd.; Brandis 403; Gamble 76. Vern. *Geti, gainti*, Hind.; *Dar*, Nep.; *Sedeng*, Lepcha.

A small tree Wood red, moderately hard, even grained, seasons well Pores scanty, moderate-sized, often subdivided Medullary rays fine to broad, short, the distance between the rays as large as or larger than the transverse diameter of the pores The medullary rays shew on a radial section, giving the wood a mottled appearance

Garhwal Kumaun Nepal Sikkim and Bhutan

Growth fast 2 to 5 rings per inch of radius Weight 41 lbs per cubic foot It is a nice wood easy to cut and work and is used in Kumaun and Nepal for making bowls, in Sikkim for milk pails churns and other dairy utensils The Lepchas make cups bowls and tobacco boxes of it

O 324	Garhwal (1868)	lbs
O 300J	(1874)	35
E 600	Khokloong Forest Darjeeling Terai	44
E 2443	Mangwa, Tista Valley, Darjeeling 3 000 feet	46
		39

2 B *platyphylla*, Don, Brandis 403, Gamble 76 Vein *Gargela*, Hind, *Kamli*, Nep This is var *rotundifolia*, Wedd

A large shrub or small tree Bark thin greyish brown, longitudinally striated Wood moderately hard, reddish brown with occasional concentric bands of darker and lighter colour Pores moderate-sized, scanty Medullary rays moderately broad, the distance between them greater than the transverse diameter of the pores

Outer Himalaya up to 7 000 feet Khasia Hills E Bengal S India and Ceylon

E 3377 Darjeeling 6 500 feet

## 2 POUZOLZIA, Gaudichaud

Includes several Indian herbs or undershrubs

1 P *viminea*, Wedd, Brandis 405, Kuiz ii 425, Gamble 77 Vern *Chhota kuail*, Nep, *Kyungbi*, Lepcha

A shrub or small tree with thin, grey bark Wood light reddish brown, hard, apt to warp Pores small and moderate sized, often subdivided, uniformly distributed Medullary rays moderately broad, numerous, uniform and equidistant

Kumaun, Nepal Sikkim Eastern Bengal Assam and Chittagong, ascending to 5 000 feet

Weight 37 lbs per cubic foot Growth very fast The leaves are eaten by Lepchas The bark is used to make ropes

E 2447	Latpanchor, Darjeeling 4 500 feet	lbs
		37

## 3 VILLEBRUNEA, Gaudichaud

Three species *V appendiculata* Wedd Gamble 77 (*Oreocnide acuminata*, Kuiz ii 427 *Urtica acuminata* Roxb Fl Ind iii 592) Vern *Lipic lipiah* Nep, *Kaphiti*, Lepcha *Bun rhea* Ass is a small tree of the North East Himalaya,

1. V. *frutescens*, Bl, Brandis 406, Gamble 77 *Urtica frutescens*, Thunb, Roxb Fl Ind iii 589 Vern *Gar tashiara*, *poidhauia*, *lagshi*, Kumaun, *Kirma*, Nep, *Takbret*, Lepcha

A shrub or small tree with a rough, dark grey bark. Wood brown moderately hard. Pores small. Medullary rays fine and broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Himalaya, from Simla eastwards, Sikkim, Bhutan and Assam, ascending to 5,000 feet.

The fibre is used for ropes.

H 3130. Simla, 5,000 feet.

#### 4. DEBREGGEASIA, Gaudichaud.

1. *D. bicolor*, Wedd.; Brandis 405. *Urtica bicolor*, Roxb. Fl. Ind., iii. 589. Vern. *Kharwala*, *shakai*, Afg.; *Chainchar*, *chainjli*, *amrer*, *sandāri*, Jhelum; *Sansaru*, *süss*, Chenab; *Siaru*, *talsiari*, Ravi; *Pincho*, *prin*, Sutlej; *Tashiāri*, Kumaun.

A large shrub. Bark thin, grey. Wood soft, grey. Pores small and moderate-sized, uniformly distributed. Medullary rays moderately broad, uniform and equidistant.

Salt Range, North-West Himalaya, ascending to 5,000 feet.

Growth fast, 3 to 4 rings per inch of radius. Weight, 27 lbs. per cubic foot. The fibre is made into twine and ropes.

H 88. Bhajji, Simla, 4,000 feet . . . . . lbs.  
27

2. *D. longifolia*, Wedd.; Brandis 405; Gamble 77. *Morocarpus longifolius*, Bl.; Beddome cccxvi.; Kurz ii. 428. Vern. *Tashiari*, Nep.; *Kamhyem*, Lepcha; *Capsee*, Kan.; *Pwot-chau-beng*, Burm.

A small tree. Bark thin, greyish-brown, rough. Heartwood reddish brown, hard; sapwood white. Pores moderate-sized, scanty; annual rings marked by a line of closer pores. Medullary rays moderately broad, uniform, the distance between them equal to, or greater than, the transverse diameter of the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills, South India and Burma. Common on old cultivations.

Growth fast, 4 rings per inch of radius. The fibre of the bark is occasionally used for ropes and to make fishing nets.

E 3328. Darjeeling, 6,500 feet.

3. *D. leucophylla*, Wedd. *Morocarpus Wallichianus*, Miq.; Kurz ii. 428. Vern. *Pūrāni*, Nep.; *Senén*, Lepcha.

A small tree, erect or epiphytic. Bark brown fibrous, peeling off in small vertical papery flakes. Annual rings distinctly marked by a white line. Pores large, scanty, medullary rays fine to moderately broad, often bent where they touch the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills and down to the upper forests of the Pegu Yoma.

Growth moderate, 5 rings per inch of radius. A very pretty plant with round leaves of the purest white beneath. Fibre used sometimes for cordage.

E 3329. Darjeeling, 6,000 feet.

#### 5. STREBLUS, Loureiro.

1. *S. asper*, Lour.; Beddome cccxi.; Brandis 410; Kurz 464; Gamble 73. *Trophis aspera*, Retz; Roxb. Fl. Ind. iii. 761. Vern.

*Jindi*, Pb , *Siora*, *larchanua*, *rusa*, Hind , *Sheora*, Beng , *Sahada*, Uriya , *Baranki*, *barinka*, *pakli*, Tel , *Kareia*, *kharaoli*, Mar , *Karasm*, *Gondi*, *Mitli*, Kan , *Ugnai*, Mgh , *Opnai*, Burm , *Gallao mittul*, Cingh

A small evergreen tree Bark  $\frac{1}{2}$  inch thick, soft, light grey, irregularly ribbed Wood white, moderately hard, no heartwood, no annual rings Pores small, in irregular concentric belts of soft tissue which contain the greater number of the pores and alternate with broader belts of firm tissue, in which a few pores are scattered Medullary rays fine, numerous, equidistant

Sub Himalayan tract from the Beas eastwards Bengal Central and South India, Burma and the Andaman Islands

O 1478 Gonda Oudh  
C 1163 Ahiri Reserve Central Provinces

lbs  
40  
39

## 6 PLECOSPERMUM, Trecul

1 *P spinosum*, Trecul, Beddome cexx , Brandis 401 *Batis spinosa*, Roxb Fl Ind iii 762 Vern *Mainakat lara*, *maidal-lari*, Nep , *Gumbengfong* Mechi (?) , *Koruti*, Tel

A large thorny shrub Bark thin, orange coloured, peeling off in thin brittle flakes Wood greyish white with a small bight orange-yellow heartwood, which is very hard Pores from small to large, joined by wavy, more or less concentric bands or lines of soft and often interrupted tissue, which alternate with shining bands of firmer texture of about the same width In the heartwood the pores are filled with a yellow resinous substance Medullary rays fine and very fine, wavy

Salt Pange (rare on mountains at 3 000 feet) Rohilkhand Nepal Sikkim South India and Ceylon

Growth slow 12 rings per inch of radius Weight 50 lbs per cubic foot The wood is used in the Darjeeling Terai to give a yellow dye

O 3134 Dehra Dun  
E 487 Khookloong Forest Darjeeling Terai  
E 2308 Darjeeling Terai  
E 2448 Tukdah Forest Darjeeling 5 000 feet

lbs  
66  
45  
52  
47

## 7 MORUS, Linn

Contains 6 species which are all referred to one *M alba* by Bureau in DC Prodr, Vol xvii

*M alba* Linn Roxb Fl Ind iii 594 Brandis 407 Vern *Tut tut tikklu*,

Brandis 409 Kurz ii 467 Vern *Tut* Hind *Milang* Burm is a tree wild and cultivated in the Himalaya from the Indus to Assam up to 4 000 feet, in Bengal and

A shrub or small tree with a rough, dark grey bark. Wood brown moderately hard. Pores small. Medullary rays fine and broad, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Himalaya, from Simla eastwards, Sikkim, Bhutan and Assam, ascending to 5,000 feet.

The fibre is used for ropes.

H 3130. Simla, 5,000 feet.

#### 4. DEBREGGEASIA, Gaudichaud.

1. *D. bicolor*, Wedd.; Brandis 405. *Urtica bicolor*, Roxb. Fl. Ind., iii. 589. Vern. *Kharwala*, *shakai*, Afg.; *Chainchar*, *chainjli*, *amrer*, *sandári*, Jhelum; *Sansaru*, *súss*, Chenab; *Siaru*, *talsiari*, Ravi; *Pincho*, *prin*, Sutlej; *Tashiári*, Kumaun.

A large shrub. Bark thin, grey. Wood soft, grey. Pores small and moderate-sized, uniformly distributed. Medullary rays moderately broad, uniform and equidistant.

Salt Range, North-West Himalaya, ascending to 5,000 feet.

Growth fast, 3 to 4 rings per inch of radius. Weight, 27 lbs. per cubic foot. The fibre is made into twine and ropes.

H 88. Bhajji, Simla, 4,000 feet . . . . . lbs.  
27

2. *D. longifolia*, Wedd.; Brandis 405; Gamble 77. *Morocarpus longifolius*, Bl.; Beddome cccxvi.; Kurz ii. 428. Vern. *Tashiari*, Nep.; *Kamhyem*, Lepcha; *Capsee*, Kan.; *Pwot-chau-beng*, Burm.

A small tree. Bark thin, greyish-brown, rough. Heartwood reddish brown, hard; sapwood white. Pores moderate-sized, scanty; annual rings marked by a line of closer pores. Medullary rays moderately broad, uniform, the distance between them equal to, or greater than, the transverse diameter of the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills, South India and Burma. Common on old cultivations.

Growth fast, 4 rings per inch of radius. The fibre of the bark is occasionally used for ropes and to make fishing nets.

E 3328. Darjeeling, 6,500 feet.

3. *D. leucophylla*, Wedd. *Morocarpus Wallichianus*, Miq.; Kurz ii. 428. Vern. *Púrúni*, Nep.; *Senén*, Lepcha.

A small tree, erect or epiphytic. Bark brown fibrous, peeling off in small vertical papery flakes. Annual rings distinctly marked by a white line. Pores large, scanty, medullary rays fine to moderately broad, often bent where they touch the pores.

North-East Himalaya up to 7,000 feet, Khasia Hills and down to the upper forests of the Pegu Yoma.

Growth moderate, 5 rings per inch of radius. A very pretty plant with round leaves of the purest white beneath. Fibre used sometimes for cordage.

E 3329. Darjeeling, 6,000 feet.

#### 5. STREBLUS, Loureiro.

1. *S. asper*, Lour.; Beddome cccxi.; Brandis 410; Kurz 464; Gamble 73. *Trophis aspera*, Retz; Roxb. Fl. Ind. iii. 761. Vern.

*Jindi*, Pb , *Siora*, *karchanna*, *rusa*, Hind , *Sheona*, Beng , *Sahada*,  
*Uriya*, *Baranki*, *barinka*, *pakki*, Tel , *Karera*, *kharaoli*, Mar , *Karasni*,  
*Gondi*, *Mitti*, Kan , *Ungnai*, Magh , *Opnai*, Burm , *Gattao nittul*,  
*Cingh*

A small evergreen tree Bark  $\frac{1}{2}$  inch thick, soft, light grey, irregularly ribbed Wood white, moderately hard, no heartwood, no annual rings Pores small, in irregular concentric belts of soft tissue which contain the greater number of the pores and alternate with broader belts of firm tissue, in which a few pores are scattered Medullary rays fine, numerous, equidistant

Sub Himalayan tract from the Beas eastwards Bengal Central and South India, Burma and the Andaman Islands

45 lbs Kyd 42 to 76 lbs ; our  
 per P = 604 The wood is tough

and the rough leaves to poison wood and ivory

O 1478 Gonda Oudh  
 C 1163 Ahuri Reserve Central Provinces

lbs  
 40  
 39

## 6 PLECOSPERMUM, Trecul

1 *P. spinosum*, Trecul, Beddome cccx Brandis 401 *Batis spinosa*,  
 Roxb Fl Ind iii 762 Vern *Mainakat-lara*, *maidal lari*, Nep ,  
*Gumbengfong* Mech ( ? ), *Koriti*, Tel

A large thorny shrub Bark thin, orange coloured, peeling off in thin brittle flakes Wood greyish white with a small bright orange yellow heartwood, which is very hard Pores from small to large, joined by wavy, more or less concentric bands or lines of soft and often interrupted tissue, which alternate with shining bands of firmer texture of about the same width In the heartwood the pores are filled with a yellow resinous substance Medullary rays fine and very fine, wavy

Salt Range (rare on mountains at 3000 feet) Rohilkhand Nepal Sikkim, South India and Ceylon

Growth slow 12 rings per inch of radius Weight 50 lbs per cubic foot The wood is used in the Darjeeling Terai to give a yellow dye

O 3134 Dehra Dun  
 E 487 Khookloong Forest Darjeeling Terai  
 E 2308 Darjeeling Terai  
 E 2449 Tukdah Forest Darjeeling 5000 feet

lbs  
 56  
 45  
 52  
 47

## 7 MORUS, Linn

Contains 6 species which are all referred to one *M alba* by Bureau in DO Prodr, Vol xvii

*M alba* Linn Roxb Fl Ind iii 594 Brandis 407 Vern *Tut tul tulku*,

Burma. Its fruit is long, cylindrical, sweet, but insipid. *M. atropurpurea*, Roxb. Fl. Ind. iii. 595, is a kind which was introduced from China and is now cultivated in many parts of India.

Wood hard, even-grained, seasons well, with yellow or brown heartwood. Annual rings distinctly marked generally by a belt of larger pores. Medullary rays fine, uniform.

1. *M. indica*, Linn.; Roxb. Fl. Ind. iii. 596; Brandis 408; Kurz ii. 468; Gamble 77. Vern. *Túl*, Pb.; *Tutri*, Hind.; *Shaktút*, Kumaun; *Túl*, Beng.; *Chhota kimbu*, Nep.; *Mekrap*, Lepcha; *Nuni*, Ass.; *Posa*, Burm.

A moderate-sized deciduous tree. Wood yellow with darker streaks of various colours, hard. Annual rings distinctly marked by a belt of closely packed, moderate-sized and large pores which are generally subdivided. The pores in the outer portion of the annual ring are very small, in small, irregular patches, uniformly distributed. Medullary rays moderately broad, short. The structure of this wood is very similar to that of *Morus alba* of Europe and Japan, but the medullary rays are broader and further apart.

Sub-Himalayan tract ascending to 5,000 feet, Sikkim valleys up to 4,000 feet. Cultivated throughout North India.

Growth, the specimen received from Multán had very little more than one ring per inch of radius; that from Madhopur shewed 5 rings; its growth must therefore be considered very fast.

Weight, our specimens gave, the Multán one, 42; the Madhopur one 47 lbs. per cubic foot. It is largely cultivated for its leaves, which are used to feed silkworms. In Assam, the silk of the 'Pat' worm (*Bombyx Textor* and *B. Cræsi*) is produced on this mulberry.

P 891.	Multán .	.	.	.	.	.	.	.	.	lbs.
P 1195.	Madhopur	.	.	.	.	.	.	.	.	42
		.	.	.	.	.	.	.	.	47

2. *M. serrata*, Roxb. Fl. Ind. iii. 596; Brandis 409. Vern. *Karún*, *tút*, *káura*, *túlákúl*, *soá*, *án*, *shta*, *chimu*, *kimu*, Pb.; *Kimu*, *himu*, Hind.

A large deciduous tree. Bark greyish brown. Sapwood small, white; heartwood yellow or brown, with a slight lustre, moderately hard. Annual rings distinctly marked by a line or irregular belt of moderate-sized and large pores. Pores frequently subdivided, filled with gum. In the outer portion of each annual ring the pores are small and moderate-sized, scanty, often arranged in groups. Medullary rays moderately broad.

North-West Himalaya between 4,000 and 9,000 feet.

Growth moderate, our specimens averaging 8 rings per inch of radius. Weight, 35 to 36 lbs. per cubic foot. It is often of very large size. Dr. Stewart noted several trees of 20 feet girth, and one at the Hindu temple at Barmaor, Chamba 7,000 feet, of 28 feet girth. It works well, does not warp, and takes a beautiful polish, shewing a golden lustre. It is used for troughs, agricultural implements and for cabinet-work. It is much esteemed by the Simla wood-carvers.

H 3174.	Dungagalli, Hazara, 7,000 feet	.	.	.	.	.	.	lbs.
H 10.	Julung, Simla, 4,000 feet	.	.	.	.	.	.	...
H 28.	Madhan, Simla, 5,000 „	.	.	.	.	.	.	36
H 95.	Simla, 6,000 feet	.	.	.	.	.	.	35
		.	.	.	.	.	.	36

3. *M. cuspidata*, Wall. *M. serrata*, Roxb.; Gamble 77. Vern. *Kimbu*, Nep.; *Nambyong*, Lepcha; *Singtok*, Bhutia; *Bola*, Ass.

A tall tree. Wood yellow, with yellowish brown heartwood, hard, close-grained, with a beautiful lustre. Annual rings marked by a white

line and sometimes by a continuous string of pores. Pores uniformly distributed, moderate-sized to large, often oval and subdivided, each pore in a narrow ring of soft tissue, prominent on a vertical section. Medullary rays fine and moderately broad; the distance between the rays generally equal to, or larger than, the transverse diameter of the pores. Medullary rays prominent on a radial section, giving the wood a markedly mottled appearance.

Valleys of the Outer Eastern Himalaya, from Sikkim to Assam

much used for tea boxes, but would be extremely suitable. It resembles that of *M. serrata*, and would be good for planking, furniture and cabinet-work

		lbs	imens over The been
E 706	Great Rangit Valley, Darjeeling, 3,500 feet	43	
E 3376.	" " " " 1,000 "	41	
E 656	Bamunpokri, Darjeeling "	48	
E 2306	Eastern Duars, Assam .	47	
E 2196	Nowgong, Assam .	42	
E 2305	Kamrup, "	49	

No 2965 is the "Fustic" *Maclura tinctoria*, D Don, from the West Indies, Central and South America, whose wood is used for dyeing different shades of yellow, moderate sized to large, are fine, prominent, transverse diameter aurantiaca, Nuttall,

## 8. ARTOCARPUS, Linn.

About 8 Indian species *A. calophylla*, Kurz, *A. rufescens*, Miq, *A. Gomek-sana*, Wall, and *A. rigida*, Bl. (*A. echinata*, Roxb. Fl Ind iii 527), are all trees described in Kurz ii 4. wood and gives a kind the "Bread Fruit" T Ceylon and Burma, Bengal

The wood of the species of *Artocarpus* here described is very uniform in character. Heartwood moderately hard to hard, sometimes yellow, seasons well, weighs between 30 and 50 lbs. Pores moderate-sized to large, often in circular light-coloured rings of softer tissue, prominent on a longitudinal section. Medullary rays fine to moderately broad, very distinct, the distance between the rays generally about equal to the transverse diameter of the pores

Fl. Ind. iii. 522; Beddome cccix; 73 The Jack Tree Vern Kan-Uriya, Tel; Phanás, Mar., Pilla, Kan.; Teprong, Gáro; Peingnai, Burm; Cos, Cingh

A large tree. Bark thick, blackish, deeply cracked. Heartwood yellow or rich yellowish brown, darkening on exposure, compact, even-grained, moderately hard, seasons well and takes a fine polish. Pores often oval and subdivided, moderate-sized to large, in irregular patches of soft tissue, which are often arranged in short oblique lines or



groups, sometimes filled with a white substance which is visible on a vertical section. Pores prominent on a vertical section. Medullary rays numerous, fine and moderately broad.

Cultivated throughout India, except in the northernmost part. Wild in the mountain forests of the Western Ghâts, ascending to 4,000 feet (Beddome).

The growth appears to be very fast, but the rings are indistinct and difficult to count. The following experiments have been made to determine the weight and transverse strength:—

	Weight.	P=
Puckle in 1850 in Mysore (4 experiments), with bars 2' × 1" × 1" found	42 lbs.	562
Skinner, No. 17, in 1862 in South India . . . . .	" 44 "	788
Adrian Mendis, No. 16, in 1855, in Ceylon, with bars		
2' × 1" × 1" . . . . .	" 42 "	712
Wallich . . . . .	" 42 "	...
" in 1862 in Travancore . . . . .	" 35 "	...
Warth in 1878 with specimens below given . . . . .	" 40 "	...

The wood is largely used for carpentry, boxes and furniture, and is exported to Europe for cabinet work, turning and brush-backs. The wood yields a yellow dye used in Burma to dye the yellow clothes worn by "phoangies." The tenacious milky juice is used as birdlime. The fruit is very largely used all over India for food, but, except the seeds, rarely by Europeans. It has an unpleasant smell when ripe. The fruit in young trees is borne on the branches, in older trees on the trunk, and in very old trees near the root.

	lbs.
E 598. Darjeeling Terai (young tree) . . . . .	38
E 2444. Siliguri, Bengal . . . . .	41
W 756. South Kanara . . . . .	43
B 806. Tharrawaddi, Burma . . . . .	30
No. 9. Salem Collection . . . . .	42
No. 16. Ceylon " . . . . .	41

2. *A. Lakoocha*, Roxb. Fl. Ind. iii. 524; Beddome cexix.; Brandis 426; Kurz ii. 433; Gamble 73. Vern. *Tiún, dhen, duho*, Ph.; *Dahu, dhau, barhat, lakúch*, Hind.; *Dháó*, Kumaun; *Dephúl, dehua*, Beng.; *Dowa, chama, chamba*, Ass.; *Dawa*, Cachar; *Kamma regu, laku-chamma, nakka-rennu*, Tel.; *Myonklouk*, Burm.; *Cauna-gona*, Cingh.

A large tree. Bark  $\frac{1}{3}$  inch thick, dark grey, rough. Sapwood large, white, soft, perishable. Heartwood yellow, hard. Pores large, enclosed in rings of light coloured, soft tissue, uniformly distributed. Medullary rays fine and moderately broad, very distinct, prominent on a radial section.

Outer Hills of Kumaun, Sikkim, Eastern Bengal, Burma, evergreen forests of Western Ghâts and Ceylon.

Growth fast, 3 to 4 rings per inch of radius. Weight, our specimens give on an average, 39.5 lbs. per cubic foot; Brandis in his Burma List of 1862, No. 92, gave 40 lbs. The wood seasons well, takes a good polish and is used for furniture and canoes. Mann says the bark is chewed in Assam. The male flower-heads are pickled and the fruit is eaten.

	lbs.
E 2445. Siliguri, Bengal . . . . .	48
E 794. Kámrúp, Assam . . . . .	36
E 1402. Chittagong . . . . .	43
W 740. South Kanara . . . . .	47
B 810. Rangoon Division, Burma . . . . .	30
B 2553. Burma (1862) . . . . .	39
No. 67. Ceylon Collection (marked <i>Artocarpus</i> sp. Vern. <i>Patta-del</i> )	34

3. *A. Chaplasha*, Roxb. Fl. Ind. iii. 525; Brandis 426; Kurz ii. 432; Gamble 73. Vern. *Chaplash, chaplis*, Beng.; *Lut-ter*, Nep.; *Chram, Gávo*; *Sam*, Ass.; *Cham*, Cachar; *Pani, toponi*, Magh; *Youngpeingnai*, Burm.; *Kaila-dá*, And.

A large tree. Heartwood shining, moderately hard. Pores large filled with a white substance, prominent on a vertical section, and

groups, sometimes filled with a white substance which is visible on a vertical section. Pores prominent on a vertical section. Medullary rays numerous, fine and moderately broad.

Cultivated throughout India, except in the northernmost part. Wild in the mountain forests of the Western Ghâts, ascending to 4,000 feet (Beddome).

The growth appears to be very fast, but the rings are indistinct and difficult to count. The following experiments have been made to determine the weight and transverse strength:—

	Weight.	P=
Puckle in 1859 in Mysore (4 experiments), with bars 2' X 1" X 1" found	42 lbs.	562
Skinner, No. 17, in 1862 in South India	" 44 "	788
Adrian Mendis, No. 16, in 1855, in Ceylon, with bars		
2' X 1" X 1"	" 42 "	712
Wallich	" 42 "	...
" in 1862 in Travancore	" 35 "	...
Warth in 1878 with specimens below given	" 40 "	...

The wood is largely used for carpentry, boxes and furniture, and is exported to Europe for cabinet work, turning and brush-backs. The wood yields a yellow dye used in Burma to dye the yellow clothes worn by "phoongies." The tenacious milky juice is used as birdlime. The fruit is very largely used all over India for food, but, except the seeds, rarely by Europeans. It has an unpleasant smell when ripe. The fruit in young trees is borne on the branches, in older trees on the trunk, and in very old trees near the root.

	lbs.
E 598. Darjeeling Terai (young tree)	38
E 2414. Siliguri, Bengal	41
W 756. South Kanara	43
B 806. Tharrawaddi, Burma	30
No. 9. Salem Collection	42
No. 16. Ceylon	44

2. *A. Lakoocha*, Roxb. Fl. Ind. iii. 524; Beddome cexix.; Brandis 426; Kurz ii. 433; Gamble 73. Vern. *Tián, dheu, daheo*, Pb.; *Dahu, dhau, barhat, lakúch*, Hind.; *Dháo*, Kumaun; *Dephúl, dehua*, Beng.; *Dowa, chama, chamba*, Ass.; *Dawa*, Cachar; *Kamma regu, laku-chamma, nakka-renu*, Tel.; *Myonklouk*, Burm.; *Cauna-gona*, Cingh.

A large tree. Bark  $\frac{1}{2}$  inch thick, dark grey, rough. Sapwood large, white, soft, perishable. Heartwood yellow, hard. Pores large, enclosed in rings of light coloured, soft tissue, uniformly distributed. Medullary rays fine and moderately broad, very distinct, prominent on a radial section.

Outer Hills of Kumaun, Sikkim, Eastern Bengal, Burma, evergreen forests of Western Ghâts and Ceylon.

Growth fast, 3 to 4 rings per inch of radius. Weight, our specimens give on an average, 39.5 lbs. per cubic foot; Brandis in his Burma List of 1862, No. 92, gave 40 lbs. The wood seasons well, takes a good polish and is used for furniture and canoes. Mann says the bark is chewed in Assam. The male flower-heads are pickled and the fruit is eaten.

	lbs.
E 2445. Siliguri, Bengal	48
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No. 67. Ceylon Collection (marked <i>Artocarpus</i> sp. Vern. <i>Patta-del</i> )	34

3. *A. Chaplasha*, Roxb. Fl. Ind. iii. 525; Brandis 426; Kurz ii. 432; Gamble 73. Vern. *Chaplash, chaplis*, Beng.; *Lut-ter*, Nep.; *Chram*, Gáro; *Sam*, Ass.; *Cham*, Cachar; *Pani, toponi*, Magh; *Toungpeingnai*, Burm.; *Kaita-dá*, And.

A lofty deciduous tree Bark of young trees smooth, light grey with dark blotches, of old trees dark brown, tuberculate,  $\frac{1}{2}$  inch thick. Wood yellow to brown, moderately hard, even grained, rough, durable, seasons well Pores large and moderate-sized, uniformly distributed Medullary rays short, fine and moderately broad Pores frequently filled with a white substance

Eastern Bengal Burma and the Andaman Islands

Growth rather fast, 5 to 6 rings per inch of radius Weight 368 for the average of our 14 specimens, Brandis Burma List of 1862, No 91 gives 39 lbs, No 92 gives 30 lbs No 15 Skinner (1862) (*Artocarpus echinatus* Vern *Tbungpeingna*), gives Weight = 63 lbs, P = 672 Bennett (1872) gives Weight = 32 lbs, P = 459 for Andaman wood The wood seems to get harder and heavier as it gets older, two of our specimens from the Andaman Islands cut in 1866 and stored since then in Calcutta give respectively 46 and 62 lbs, and Skinner gives 63 lbs, but this is probably a mistake It is much used for canoes in Sikkim and Assam for planking, tea boxes and furniture Kurz says it gives a tenacious milky caoutchouc The leaves of young plants are pinnatifid resembling a gigantic hairy leaf of *Quercus Robur*, those of old trees are oblong, entire

E 587	Khokloong Forest, Darjeeling Terai (young)	lbs.
E 629	Eastern Duars Assam	30
E 2301	Kamrup, Assam	32
F 2186	Nowgong "	33
E 721	Chittagong "	35
B 2554	Burma (1862)	33
B 2693	Tavoy (Wallich, 1828)	39
B 2683	( " )	37
B 2204	Andaman Islands, (1866)	32
B 2211	" " "	62
B 2289	" " "	33
B 512	" " "	46
B 2499	" " (Home 1874 Nos 4 and 5)	34
		{ 31
		{ 48

4. *A. hirsuta*, Lamk, Roxb Fl Ind m 521, Beddome t 308, Brandis 426 Vern *Ayni, anyalli, anyanepela*, Tam, *Aini, anyeni*, Mal, *Hebalsu, heb halasu, hesswa, hessain*, Kan, *Hebalsu, pat-phanas, ran-phanas*, Mar

A lofty evergreen tree Heartwood hard to very hard, yellowish brown, durable, seasons well Pores moderate sized to large, enclosed in narrow rings of soft tissue, often filled with a white substance Medullary rays fine to moderately broad, wavy, very distinct

Evergreen forests of the W. coast of India 3 feet  
Grac for proper counting  
Weigh tree specimens average  
34 lbs the western coast for  
house

D 1090	Madura, Madras	lbs
W 1219	North Kanara	32
W 744	South "	31
W 755	" "	39
		41

(This last specimen differs by having very short moderately broad, medullary rays and pores in irregular patches of soft texture, it may possibly be *A. Lakoocha*)

5. *A. nobilis*, Thw Enum 262, Beddome t. 309 Vern *Del, aludel*, Cingh

A large tree Heartwood shining, moderately hard Pores large filled with a white substance, prominent on a vertical section, and

thereby giving the wood an elegant mottled appearance. Medullary rays short, moderately broad; the distance between the rays being equal to the transverse diameter of the pores.

#### Ceylon.

Weight, Adrian Mendis' two experiments made in 1855 with bars 2 feet  $\times$  1 inch  $\times$  1 inch gave: No. 2, weight 51 lbs.,  $P = 712$ ; No. 21, weight 40 lbs.,  $P = 528$ . The specimens, now again weighed, give 40 and 49 lbs. respectively. Wood used for canoes and furniture. The seeds are roasted and eaten by the Cinghalese.

No. 2.	Ceylon Collection marked <i>A. pubescens</i>	.	.	.	lbs.
No. 21.	" " " "	.	.	.	51
					40

### 9. ANTIARIS, Lesch.

1. *A. toxicaria*, Lesch.; Kurz ii. 462. *A. innoxia*, Bl.; Beddome t. 307; Brandis 427. *A. saccidora*, Dalz. The Upas Tree. Vern. *Alli, netavil*, Tam.; *Jazúgri, karwat, jagúri*, Kan.; *Jasúnd*, Bombay; *Araya-angely*, Mal.; *Riti*, Cingh.; *Myah-seik*, Burm.

A gigantic evergreen tree attaining a height of 250 feet, with thick grey bark. Wood white, soft, even-grained. Annual rings faintly marked. Pores large and moderate-sized, often subdivided. Medullary rays moderately broad, undulating, uniform and equidistant; the distance between two rays generally equal to the transverse diameter of the pores, which are prominent on a vertical section.

Evergreen forests of Burma, the Western Ghâts and Ceylon.

Growth fast, 4 to 6 rings per inch of radius. Weight, 25 lbs. per cubic foot. Beddome says it is the largest tree in the forests of the western coast, and that it reaches 250 feet in height, with an enormous girth. It exudes a white poisonous resin used for poisoning arrows. The inner bark gives a good fibre which makes strong cordage; it is also stripped off whole from a branch or young tree to form sacks which are used to carry rice.

B 813.	Rangoon Division, Burma	.	.	.	.	.	lbs.
							25

Nos. E 408 from the Sundarbans, E 1294 from Cachar, and W 729 from South Kanara resemble this in structure.

### 10. FICUS, Linn.

A large genus containing more than 80 Indian species. They are trees or shrubs often climbing, but more often epiphytic, and some species are of enormous size. *F. tomentosa*, Willd.; Roxb. Fl. Ind. iii. 550; Beddome cccxiii.; Brandis 414. Vern. *Petta-mari*, Tel., is a large tree of Banda, Behar, Central and Southern India. *F. Wightiana*, Wall.; Beddome cccxii.; Brandis 414, is a large tree of Southern India. *F. mysorensis*, Roth.; Brandis 414; Kurz ii. 440; Gamble 73. Vern. *Sunkong*, Lepcha; *Goni*, Kan. is a large epiphytic tree of Sikkim, Martaban, Mysore and the Western Ghâts. *F. laccifera*, Roxb. Fl. Ind. iii. 545; Beddome cccxiii.; Kurz ii. 441; Gamble 74. Vern. *Yokdúng*, Lepcha; *Prab, phegran*, Gáro; *Bur*, Ass.; *Nyounghen*, Burma, is a large epiphytic tree of the North-East Himalaya, Eastern Bengal, Burma, South India and the Andamans, giving India-rubber, but more sparingly and of not such good quality as that of *F. elastica*. *F. obtusifolia*, Roxb. Fl. Ind. iii. 546; Kurz ii. 443; Gamble 74. Vern. *Krapchi*, Mechi; *Nyoungh-kjap*, Burm.; *Date*, Magh, is a small-leaved epiphytic tree of Northern and Eastern Bengal and Burma, also yielding a moderately good variety of caoutchouc. *F. triloba*, Ham.; Brandis 423 (*F. hirsuta*, *F. hirta*, Roxb. Fl. Ind. iii. 528-531. *F. Roxburghii*, Miq.; Gamble 75) Vern. *Dungra, khura dumúr*, Beng.; *Kasreto*, Nep.; *Gyasay*, Lepcha; *Mhow, man*, Ass., is a handsome small tree of

1  
f  
1

gong  
F *Carica* Linn Brandis 418 The Fig Vern *Anjur* Hind *Kimri fagu*,  
*faouri figari* Pb is cultivated in the plains of North West India and hills up to  
5000 feet but the produce is generally poor Mathieu l1 For page 251 gives the  
weight of the wood at 34 to 45 lbs per cubic foot The wood is soft, white with a

y numerous  
very great

forest interest

The structure of all species of *Ficus* is exceedingly uniform Wood  
generally soft, marked by alternate bands of soft and firm tissue, no  
heartwood Pores small to large, scanty, except in the wood of the  
scandent species, which is porous as usual in the case of climbers Medul-  
lary rays generally of two classes, fine and moderately broad As far as  
the materials at our disposal permit us to venture upon a classification,  
we should be inclined to say that there are two types which differ more  
in the general appearance of the wood than in structure *Ficus religiosa*,  
*elastica*, *relusa*, *Cunia*, *nemoralis* and *virgata* have wood of plain, smooth  
appearance, which, though the medullary rays are apparent on a radial  
section, is not mottled and streaked as in the other species The species  
with rough, mottled and streaked wood are *Ficus bengalensis*, *infectoria*,  
*cordifolia*, *comosa*, *regia*, *glomerata* and *Roxburghii* *Ficus virgata* differs  
from all the rest by having white, more compact wood *F parasitica*  
has the large pores of a climber

1 F *bengalensis*, Linn, Beddome cxxii, Brandis 412, Kurz ii.  
440, Gamble 73 F *indica*, Roxb Fl Ind iii 539 The Banyan  
Vern *Bor, bar, ber, bargat*, Hind, *Bur, but*, Beng, *Boru*, Uriya,  
*Borhar*, Nep, *Kangji*, Lepcha, *Lanket*, Garo, *Bot*, Ass, *Barelli*,  
Gondi, *Wora*, Kurku, *Ala*, Tam, *Man peldi man*, Tel, *Ahlada*, *ala-*  
*damara*, *ala*, Kan, *Peralu*, Mal, *War, tuda*, Mai, *Maha nuga*, Cingh,  
*Pyee-nyoung*, Burm

A large evergreen tree, throwing down numerous aerial roots from the  
branches Bark  $\frac{1}{2}$  inch thick, greyish white, smooth, exfoliating in small  
irregular plates Wood grey, moderately hard, no heartwood Pores  
scanty, moderate sized, joined by narrow, wavy, concentric bands of soft  
tissue alternating with broader bands of firmer tissue and darker colour  
Medullary rays fine, equidistant, prominent On a radial section pores  
and medullary rays distinctly marked, giving the wood a mottled  
appearance

Planted by Hindoos through out India up to 4000 feet, wild in the Sub Himalayan  
tract Bengal and Central India

The rate of growth is not distinguishable by means of the annual rings, but  
it is known that it is very fast The tree sends down aerial roots from the branches,  
these root in the ground and grow into separate trunks which serve as supports for  
the branches and as feeders for the tree which thus largely increases in aerial of  
foliage Roxburgh states that he saw some trees with fully 500 yards circumferece  
round the spread of branches and about 100 feet high Brandis says that many

villages situated in fertile valleys among the mountains. Balfour says that Marsden mentions a tree near Patna having a diameter of 363 to 375 feet of spread, circumference of shadow 1,116 feet, with 50 to 60 principal stems. The well-known tree in the Botanic Gardens, Calcutta, which was ascertained by Falconer to have grown in 1782 from a seed deposited in the crown of a date palm, and which is consequently now 98 years old, measured when examined by Falconer in 1831, Hooker in 1847, and Balfour in 1863, 300 feet in diameter of spread and 80 feet in height. It has since suffered severely in the cyclones of 1864 and 1867. Brandis met with a tree at Chicholi in Hoshungabad district, Central Provinces, 85 feet high with a diameter of 275 feet, and occupying an area of  $1\frac{1}{2}$  acres. Its aerial roots were not, as usual in cultivation, assisted by bamboos, but small mounds of earth were heaped up to meet and receive them.

Weight, Skinner (No. 70) gives 36 lbs.; our specimens weigh 38 and 39 lbs. per cubic foot. Skinner gives  $P = 600$ .

The wood is of little value, but is durable under water, and therefore used for well curbs. It is sometimes used for boxes and door panels. The wood of the drops is stronger and is used for tent poles, cart yokes and banghy poles. The bark and small root drops give a coarse fibre for rope-making. Five specimens were sent to the 1878 Paris Exhibition from Berar (No. C 981). The milky juice is made into birdlime, the leaves are used as plates, and the fibre is used for slow matches by the Sikhs. Lac is sometimes collected on it, the leaves are used to cure bruises, the bark in native medicine, and the fruit is sometimes eaten. It is a common avenue tree, and being evergreen, fast-growing and easily propagated by large cuttings is very useful for planting on road-sides. Cuttings, 8 to 10 feet long, planted in July, succeed well. The *Gori* or *Deomuga* silkworm (*Bombyx religiosa*) feeds on its leaves in Assam. It is one of the epiphytic species of *Ficus*, which do so much harm to valuable timber trees in the forests, and which often has to be cut.

	lbs.
C 1150. Ahiri Reserve, Central Provinces . . . . .	38
C 836. Bairagarh Reserve, Berar . . . . .	39
C 2813. Melghát, Berar . . . . .	...

2. *F. infectoria*, Willd.; Roxb. Fl. Ind. iii. 551; Beddome cccxii., Brandis 414; Kurz ii. 446; Gamble 75. *F. venosa*, Ham. Vern. *War, batbar, jangli pipli, palakh, trimbal*, Pb.; *Pil Khan, kahimmal, ramanjir, pákhar, pakri, keol, kaim, khabar*, Hind.; *Pákar*, Beng.; *Safed kabra*, Nep.; *Kangji*, Lepcha; *Prab*, Gáro; *Serilli*, Gondi; *Pepere*, Kurku; *Jori, kall-alun*, Tam.; *Jewi, yuri*, Tel.; *Tsjakela*, Mal.; *Bassari*, Tel.; *Kari basri, bassari*, Kan.; *Nyoungechin*, Burm.

A large tree. Bark  $\frac{1}{2}$  inch thick, greenish grey, smooth, exfoliating irregularly in flakes and patches. Wood grey, moderately hard. Pores scanty, large, often subdivided, joined by narrow concentric bands of soft tissue, which alternate with broader bands of firmer texture. Medullary rays uniform, moderately broad, equidistant, prominent on a radial section.

Suliman and Salt Ranges, Outer Himalaya ascending to 5,000 feet, Bengal, Burma, Central India, Western Coast and Ceylon.

Growth rapid. Weight: according to Brandis 30 lbs.; our specimens give an average of 34 lbs. It is often found as an epiphyte on other trees, but does not send down numerous roots like the Banyan, though it often has one or two aerial roots. It is often planted in avenues. It is common in the forests; but the wood is not durable. It is used in Assam and Cachar to make charcoal. The young shoots are eaten in curries, and the leaves make good elephant fodder. The bark gives a fibre good for rope. (No. C 982 from Berar was a fine specimen.)

	lbs,
P 911. Salt Range . . . . .	31
C 1166. Ahiri Reserve, Central Provinces . . . . .	37
C 838. Bairagarh Reserve, Berar . . . . .	34
C 2808. Melghát, Berar . . . . .	...

3. *F. religiosa*, Linn.; Roxb. Fl. Ind. iii. 547; Beddome t. 314;

Brandis 415, Kurz ii 448, Gamble 75 The Peepul Vern. *Pipal*, Hind , *Aswat, asud*, Beng , *Pipli*, Nep , *Bor-bur*, Cachar , *Arasa*, Tam , *Rai, raiga, ragi, rari*, Tel , *Ali*, Gondi , *Pipri*, Kurlu , *Rangi, basri*, Kan , *Bo*, Cingh , *Nyoungbandi*, Burm.

A huge tree Bark grey, nearly  $\frac{1}{2}$  inch thick, exfoliating in rounded irregular flakes of varying size, often leaving rounded depressions Wood greyish white, moderately hard Pores moderate sized to large, often subdivided, joined by narrow bands of soft tissue, which alternate with broader bands of firmer substance Medullary rays uniform and equidistant, moderately broad, visible on a radial section, but not giving the wood a markedly mottled appearance

Wild in the Sub Himalayan tract Bengal and Central India

Growth very fast It is often planted as an avenue tree for which it is very suitable it grows well and quickly either from cuttings or seedlings The weight and transverse strength have been determined by the following experiments —

	Weight	P
Cunningham at Gwalior in 1854 in two experiments		
with bars $2 \times 1 \times 1$	found 44	458
Skinner in Madras in 1862 (No 72)	34	584
Warth with our six specimens in 1878	34.7	...

The tree being sacred is rarely felled the wood is used for fuel for packing cases and in Cachar for charcoal The leaves and branches are good elephant fodder the

on its leaves in Assam

	lbs
P 833 Multan	45
O 533 Dehra Dun	31
O 538	31
O 543	23
C 1168 Abiri Reserve Central Provinces	44
C 837 Burigah Reserve Central Provinces	34
C 2814 Melghat Berar	

4 F *cordifolia*, Roxb Fl Ind iii 518, Brandis 416, Gamble 75 F *Rumphii*, Kurz ii 448 Vern *Rumbal, palak, badha, pilkhan*, Pb , *Kabar, gayun, gayna, pipal, gaggaira, pakar, khabar*, Hind , *Kabar pipal*, Kumaun , *Gai aswat*, Beng , *Pakar*, Nep , *Pakri*, Ass , *Sat-bur*, Cachar , *Prab, Gáro, Paras pipal*, Ajmere , *Pair*, Mar , *Nyoungpyoo*, Burm

A large deciduous tree Bark smooth,  $\frac{1}{2}$  inch thick Wood very soft, spongy Pores oval, arranged in wavy, concentric bands, alternating with bands of firmer texture and of the same width Medullary rays fine, uniform, equidistant, very marked on a radial section, giving the wood a beautifully mottled appearance

Outer Himalaya from the Chenab eastwards ascending to 5000 feet Bengal, Central India and Burma

Weight 27 lbs per cubic foot Wood used in Cachar for charcoal for timber manufacture It is generally epiphytic and is then very destructive to timber trees In Assam the lac insect is reared on it (Mann) The fruit is eaten and the leaves and branches used for cattle fodder

	lbs
H 605 Chital Forest Kangra	27
P 3224 Nagpahar Ajmere	...

F 586 20 lbs sent from the Darjeeling Terai under the name of *Aswato* and F 716 (27 lbs) sent from Chittagong under those of *Hyalja Beng* , *Choupaka*, Maoh resemble this species in structure



5. *F. retusa*, Linn.; Beddome cexxiii.; Brandis 417; Kurz ii. 44.; Gamble 75. *F. nitida*, Thunb.; Wight Ic. t. 612. *F. Benjaminia*, Willd.; Roxb. Fl. Ind. iii. 550. Vern. *Kamrup*, *zir*, Beng.; *Jamu*, Nep.; *Sitnyok*, Lepcha; *Terra javi*, Tel.; *Pilála*, Kan.; *Nyoungap*, *nyoungthabyeh*, Burm.

A large evergreen tree. Wood light reddish grey, close-grained, moderately hard, beautifully mottled. Pores moderate-sized, often subdivided, scanty. Medullary rays short, moderately broad. Numerous narrow, wavy, red, concentric bands of soft tissue alternating with broader bands of firmer texture.

Kumaun, Bengal, South India, Burma and the Andaman Islands.

Weight, 40 lbs. per cubic foot. Wood used for fuel, but as it is very prettily grained it might be found valuable for tables, door panels and other purposes. It is often planted as an avenue tree, and for this, from its dense shade, it is very suitable. It is often epiphytic.

	lbs.
E 401. Sundarbans . . . . .	40
B 2278. Andaman Islands . . . . .	40
No. 45. Ceylon Collection ( <i>Ficus</i> sp., <i>Kiripelle</i> , Cingh.) . . . . .	42

6. *F. elastica*, Bl.; Roxb. Fl. Ind. iii. 541; Brandis 417; Kurz ii. 444; Gamble 74. The India-rubber Fig or Caoutchouc Tree. *Bor*, *attah bar*, Beng., Ass.; *Kagiri*, *kasmir*, Khasia; *Lesu*, Nep.; *Tok*, Lepcha; *Rauket*, Gáro.

A large evergreen tree, throwing down numerous aerial roots from the branches. Bark grey or reddish brown, smooth. Wood white or light brown. Pores moderate-sized, scanty; narrow belts of soft tissue alternating with broad belts of firmer texture and darker colour. Medullary rays fine and very fine, numerous, unequally distributed.

Outer North-East Himalaya from the Mechi river eastwards, Assam, Cachar, mountains east of Bengal and Arracan. It is found in the vicinity of the Irrawaddy river as far south as 25° north latitude, but it will probably be found further south on hills east of Arracan.

Weight, 43 lbs. per cubic foot. The wood is not used.

The tree is usually epiphytic, the seeds generally germinating at the summit of tall forest trees, where the seedlings can get light. It is often of very great height, trees 100 to 120 feet high being not unusual. It sends down innumerable aerial roots which have a reddish-brown bark, peeling off in small thin narrow strips or flakes; and these roots often extend considerable distances, giving a great spread to the tree. In Brandis' Forest Flora the measurements of a tree described by Griffith (1838) are given; these are:

Height, 100 feet.

Circumference of main trunk, 74 feet.

„ of supports, 120 feet.

„ of area covered by the branches, 610 feet.

Mann in his report of 1875 gives the following measurements for a tree at Tezpur aged 32 years, and having over 100 aerial roots:

Height 110 feet.

Diameter of crown 140 feet.

Circumference of stem with central supports 70 feet.

The tree is tapped by means of slanting notches made in the stem, aerial roots and roots about 12 inches apart. The milk is allowed to collect and coagulate in these notches for two or three days, after which time the hard India-rubber in each notch is easily collected by being pulled out in a strip. The tree will not bear yearly tapping, once in three years is as much as it will stand; if tapped yearly, it is liable to die off, as did many of the trees in Darjeeling after heavy tapping in 1871, 1872 and 1873. Those which then survived have not yet (1880) recovered sufficiently to be fit for tapping again.

It is easily propagated from seed in small beds thatched over and fenced round

to keep out the sun, and provided with small trenches filled with water. By these means a constant hot moist atmosphere is secured and seedlings do well, but the

division. The different modes used were the following —

"First — On beds covered with broken bricks, half of which was sown with entire fruit of figs and the other half with the fruit broken up or rubbed into powder

April. Germination took place best on the broken bricks, next best on the charcoal and least on the earth. The seedlings on the charcoal stood the heavy rains best, those  
 . . . . . nated in the middle of  
 . . . . . perished. They require  
 . . . . . light and sun, but as a  
 . . . . . attention than cuttings,  
 . . . . . fore they are a year old  
 . . . . . and excessive moisture  
 . . . . . cause of the mischief was

recognised

The number saved amounted, however, to about 1,200, which were on an average of the undermentioned sizes as they grew —

On the 27th June 1874  $\frac{3}{10}$ ths of an inch  
 " 12th August 1874  $1\frac{2}{10}$ ths inch  
 " 10th September 1874  $5\frac{7}{10}$ ths inches  
 " 21st April 1875, 2 feet 10 inches

"It should here be mentioned that the last of these was a seedling which has been left undisturbed in the seed bed, and was exceptionally vigorous in growth.

And Dr Schlich says "At Bamunpokri nine nursery beds were prepared, three with common garden soil, three with broken bricks, and three with charcoal, and all intersected by irrigation trenches, thus keeping the soil thoroughly moist by percolation. The seed was collected in September 1874, and sown in that month and in October partly in whole figs, and partly crumbled up by the hand. The beds were then shaded by thatch, raised 2 feet above the ground on the south, and 3 feet on the north, and the sides were closed in with mats which could be removed at will.

"From four to six weeks after sowing the seeds germinated profusely, best of all in the garden soil, next best on the broken bricks, and last, though still pretty well, on the charcoal, they have thriven well, and are now up to 5 inches high, with leaves up to 2 inches long"\*

The propagation by cuttings is still easier, but the cuttings must be from young fleshy shoots, such as are obtained by pollarding several branches of an old tree and allowing them to send out shoots. In Sikkim and Assam plants grown from seedlings or cuttings have succeeded either planted directly in the ground or in baskets of

\* Many of these trees are now (1890) 15 to 20 feet high, have many aerial roots, and a considerable girth of main stem. The plantation made of them is so dense as to be almost impenetrable and to exclude all other vegetation.

forest, and trees were planted out on these lines at distances of 50 feet. The width of lines proved insufficient as soon as the rains set in, and the excessive shade and drip from the trees on either side of the line proved injurious and in many cases fatal to the plants. The planting on split stumps of trees and in earthenware rings, placed with the widest opening on stumps was suggested by the Chief Commissioner and proved very successful in low situations, counteracting the excessive wet on the ground; but vigorous growth was not insured until more light was admitted. All the lines of last year's plantation were therefore opened to 40 feet in width, and the effect on the young trees has already been most beneficial, so that, although it is only the commencement of the growing season, nothing could surpass the vigour and healthy appearance of the trees, and so far as the planting on lines opened out through the forest goes it certainly is a perfect success. The ground on these lines was not cleared except just around the plants, but the opening out of bridle-paths has become necessary to save time in going over the plants, since frequent inspection is the only way to prevent any vacancies remaining in the plantation."

E 2449. Chawa Jhora, Sivoke, Darjeeling . . . . . lbs.  
43

7. *F. comosa*, Roxb. Fl. Ind. iii. 552; Beddome cxxiii.; Gamble 74  
*F. Benjamina*, Linn. var. *comosa*, Kurz ii. 446. Vern. *Kabra*, Nep.;  
*Kunhip*, Lepcha; *Juri pakri*, Ass.; *Putra-juvi*, Tel.

A moderate-sized, evergreen, often epiphytic tree with thin grey bark. Wood grey, beautifully mottled, moderately hard. Pores large, often subdivided, scanty. Medullary rays fine, numerous. Numerous concentric bands of soft tissue alternating with broader bands of firmer texture.

Bengal, Burma, mountains of the eastern side of the peninsula, Tinnevely.

A very pretty small-leaved fig. Weight, 34 lbs. per cubic foot. Lac is produced on it in Assam (Mann).

E 588. Bamunpokri, Darjeeling . . . . . lbs.  
34

8. *F. virgata*, Roxb. Fl. Ind. iii. 530; Brandis 419. *F. caricoides*,  
Roxb. Fl. Ind. iii. 529. Vern. *Anjir*, inzar, Afg.; *Fagu*, *fagóra*, *dudhi*,  
*dhura*, *phedu*, *kak*, *daholia* (Hills), *fagwara*, *thapur* (Plains), Pb.; *Gúlar*,  
*khabára*, *anjiri*, *beru*, *bedu*, Hind.

A moderate-sized tree. Bark grey, smooth. Wood white, close and even-grained, moderately hard. Pores small and moderate-sized, often oval and subdivided. Numerous wavy concentric bands of soft tissue, alternating with bands of equal width of firmer tissue. Medullary rays fine and moderately broad, unequally distributed. The distance between the rays is generally less than the transverse diameter of the pores.

Suliman and Salt Ranges, Outer Himalaya eastward to Nepal, ascending to 6,000 feet.

Weight, 39 lbs. per cubic foot. It often grows to a tolerably large size, reaching to 10 feet in girth. The leaves are lopped for cattle fodder, and the fruit is eaten in the Punjab hills.

P 910. Salt Range . . . . . lbs.  
H 607. Chitul Forest, Kangra . . . . . 41  
H 156. Bhajji, Simla, 3,000 feet . . . . . 38  
39

9. *F. nemoralis*, Wall.; Brandis 424.

A moderate-sized tree with smooth grey bark. Wood white, moderately hard, close-grained. Pores small and moderate-sized, in groups and short radial lines. Medullary rays fine and moderately broad. Narrow white wavy bands of soft texture alternating with belts of firmer wood.

Outer Himalaya from the Jhelum to Sikkim ascending to 7 000 feet  
Weight 38 lbs per cubic foot The leaves are lopped for cattle fodder

H 3080 Gowai, Simla, 6 000 feet

lbs  
38

10. *F. foveolata*, Wall , Brandis 423, Gamble 75 Vern *Grelu*, Simla, *Makieru*, Kunawai, *Dudila*, Nep , *Taksot*, Lepcha (It is probably *F. reticulata*, Miq , of Stewart's Punjab Plants )

An evergreen scandent shrub Wood light brown, soft, very porous Pores small to very large, very numerous Medullary rays fine, bending, the distance between the rays being less than the transverse diameter of the pores Numerous concentric bands of soft texture between the pores

Himalaya from the Sutlej to Bhutan Khasia Hills

Weight 38 lbs per cubic foot

H 2833 The Glen Simla 6 000 feet

lbs  
38

11 *F. Cunia*, Buch , Roxb Fl Ind iii 561, Beddome cccxiv , Brandis 421, Kurz ii 461, Gamble 76 Vern *Khewrau*, *khurhu kassæ*, *ghwi* Hind , *Kunia*, Kumaun, *Kanhya*, Nep , *Kawai*, *palkai*, *taikrau*, Mechi, *Sanggi*, Lepcha, *Dumbur*, *jagya domur*, Beng , *Jonua*, *sodoi*, Magh , *Ye kha ong*, Burm

A moderate sized tree Wood rough, moderately hard, greyish brown Pores small and moderate sized joined by narrow concentric bands which alternate with broader bands of firmer texture, over which a portion of the pores are scattered Medullary rays fine, equidistant

Sub Himalayan tract from the Chenab eastwards ascending to 4 000 feet Bengal

O 1365 Gonda Oidh

E 583 Bamunpokri Darjeeling Terai

E 1963 Chittagong

lbs  
36  
36  
22

12 *F. glomerata*, Roxb Fl Ind iii 558, Beddome cccxiv , Brandis 422, Kurz ii 458, Gamble 76 Vern *Kathgular*, *krumbal*, *kalammal*, *dadhu*, Pb , *Gulai*, *paroa*, *lelka*, *umar*, *umrai*, *tue*, Hind , *Dumri*, Nep , *Akhongtay*, Uriya, *Thoja*, Gondi, *Alawi*, Kui *idi*, *maru*, Tel , *Kulla kith*, Kan ,

A large tree Bark  $\frac{1}{2}$  inch thick, smooth reddish brown, with a few large cracks Wood grey, soft Pores large, joined by narrow concentric bands of soft tissue, which alternate with bands of firmer tissue and darker colour Medullary rays moderately broad, equidistant Wood mottled on a longitudinal section

Burma

Leaves two or  
is may be the  
and P = 589  
equally used  
el for cattle  
medicine and

The ripe fruit is eaten and is good either raw or stewed

	lbs.
C 1138. Ahiri Reserve, Central Provinces . . . . .	...
C 839. Bairagarh Reserve, Berar . . . . .	25
C 2796. Melghát, Berar . . . . .	...
E 643. Bamunpokri, Darjeeling Terai . . . . .	25

13. *F. Roxburghii*, Wall. ; Brandis 422 ; Kurz ii. 460. *F. macrophylla*, Roxb. Fl. Ind. iii. 556 ; Gamble 75. Vern. *Urbúl*, *urmúl*, *bar-burn*, *túsi*, *trimbal*, *tirmal*, *trímal*, *tirmi*, *tiamle*, Pb. ; *Trimmal*, *timal*, *timla*, Hind. ; *Kasrekan*, Nep. ; *Kundoung*, Lepcha ; *Demér*, Beng. ; *Sapai*, Magh ; *Sin-tha-hpan*, Burm.

A moderate-sized tree with grey warty bark. Wood reddish grey, moderately hard. Pores moderate-sized and large, often subdivided, joined by broad bands of soft tissue, alternating with darker bands of firmer texture, and of the same width, in which a few pores are found scattered. Medullary rays fine to broad, short, very prominent on a radial section, giving the wood a handsome mottled appearance.

Outer Himalaya from the Indus eastward, ascending to 6,000 feet, Sylhet, Chittagong, and Burma.

Weight, 34 lbs. The fruit is eaten and is good. The leaves are used for fodder.

II 606. Chital Forest, Kangra . . . . .	lbs. 34
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P 149 from Sainj, near Simla, 4,000 feet, Vern. *Dudela* (*Ficus glomerata*), resembles this species most. Weight, 34 lbs.

14. *F. regia*, Miq. ; Kurz ii. 459 ; Gamble 76. Vern. *Neverra*, Nep.

An evergreen tree with grey bark. Wood soft, spongy. Pores scanty, moderate-sized. Narrow bands of soft tissue alternating with broader bands of firm texture. Medullary rays short, moderately broad, very prominent on a radial section, giving the wood a mottled appearance.

North-East Himalaya and Burma.

E 689. Sepoydura Forest, Darjeeling, 5,500 feet . . . . .	lbs. 29
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15. *F. hispida*, Linn. f. ; Beddome cccxiv. ; Brandis 423 ; Kurz ii. 460 ; Gamble 76. *F. oppositifolia*, Roxb. Fl. Ind. iii. 561. *F. daemon* ; König ; Roxb. lc. 562. Vern. *Dadúri*, *degar*, *rúmbal*, Pb. ; *Kagsha*, *gobla*, *totmila*, *kat gularia*, *konea dumbar*, Hind. ; *Dhedu mera*, Panch Mehals ; *Kharwa*, Nep. ; *Taksot*, Lepcha ; *Dumar*, *kako-dumar*, Beng. ; *Poksha*, *Mechi* ; *Khoskadumar*, Ass. ; *Shakab*, Gáro ; *Boda-mamadi*, *bummarri*, *bamári*, Tel. ; *Katumer*, *bomair*, Gondi ; *Koreh*, Kurku ; *Main-lok*, Magh ; *Kadot*, Burm.

A moderate-sized tree. Bark  $\frac{1}{5}$  inch thick, grey, peeling off in irregular flakes, with slight horizontal ribs encircling the tree. Wood soft, dirty grey, no heartwood, no annual rings. Pores scanty, moderate-sized, often oval and subdivided. The pores are mostly contained in regular concentric bands of soft tissue, which alternate with firmer bands of equal width and darker colour. Medullary rays moderately broad and fine, prominent as long narrow bands on a radial section.

Outer Himalaya from the Chenab eastwards, ascending to 3,500 feet, Bengal, Central and South India, Burma and the Andaman Islands.

Growth fast, a round in the Bengal Forest Museum shows 3 rings per inch of radius Weight Kyd's Assam experiments give 25 lbs, our specimen weighs 35 lbs Kyd gives  $P = 360$  The leaves are lopped for cattle fodder This species is easily recognised by its opposite leaves

		lbs
C 1180	Ahiri Reserve, Central Provinces	.
C 2803	Melghat Berar	.
E 2450	Bamunpol ri, Darjeeling Terai	35

## 11 ULMUS, Linn

Roxb Fl  
4 000 and  
European  
the Wych  
scribed in

Brandis, pp 431 to 433

Heartwood grey Annual rings consisting of an inner porous belt with numerous large pores, and an outer belt of firm texture with small pores arranged in wavy concentric or oblique lines Medullary rays moderately broad Pores marled on a longitudinal section The wood of *U lancifolia* and *U integrifolia* differs from that of the European and North-West Indian elms

1. *U. Wallichiana*, Planch, Brandis 432 Vern *Kam, bien, brera, brankul, amrai, marai, mariun, marazh, makshari, manderung, maldung, shko, lummai, kembra*, Pb, *Mored, pabuna, chambar maya*, Hind

A large deciduous tree Bark grey, rough, with diagonal cracks, exfoliating in diamond shaped scales Heartwood greyish brown, moderately hard Annual rings marked by a soft porous belt in the spring wood, the outer part of the annual ring consisting of firm and very hard tissue Pores in spring wood moderate-sized and large, closely packed, in the autumn wood small and very small, arranged in oblique, undulating, concentric lines Medullary rays fine and moderately broad, marked on a radial section as long narrow bands

North West Himalaya from the Indus to Nepal between 3 500 and 10 000 feet Growth slow countings on our three specimens gave H 59 15 rings, H 122, 10½ rings and H 917, 25½ rings per inch of radius, the average of the three is therefore about 17 rings per inch of radius The tree often reaches a large size, 80 to 90 feet in height, with a girth of 16 to 24 feet The average weight of our three specimens is 36 lbs per cubic foot The wood is used locally in places where deodar is not available and *Pinus excelsa* not very abundant such as in Hazara where it finds a ready sale at from Rs 3 to Rs 5 per tree It certainly seems worthy of more attention The bark contains a strong fibre which is made into cordage, sandals and slow matches The leaves are lopped for cattle fodder

		lbs
H 59	Nagkanda Simla, 8 000 feet	40
H 122	Manali, Kulu 7,000 feet	35
H 917	Hazara 7 000 feet	32
H 3175	Dungagalli, Hazara, 7 000 feet	.

2 *U* sp, Brandis 433 (note under *U campestris*) Vern *Lumbok, Ladak, Bian, brahm, kai, morun, maral, mauru, mannu, mandu, mamji, marn, meiu, merinu, bhany, bhamu, chipal*, Pb

(On specimens of this tree sent to Kew lately Prof Oliver reported This Elm is the *U pedunculata*, Fouq of the Herbarium Hooker fil and Thomson I think it is not the *U pedunculata*, Fouq, of Central Europe and Asia, but probably a distinct species near to *U campestris* )

A shrub or small tree. Bark brown, surface whitish, between deep, dark-coloured, longitudinal, regular furrows, running diagonally into each other. Wood grey with darker streaks, hard, otherwise the structure is the same as that of *U. Wallichiana*.

Kulu and Hazara.

Growth, our specimens shewed a slightly faster rate than those of *U. Wallichiana*. No. II 123 gave 16 and II 918, 9 rings per inch of radius. Weight, 34 to 37 lbs. per cubic foot. Wood not used, but considered better than that of *U. Wallichiana*; our specimens, however, do not shew this superiority.

II 123.	Manali, Kulu, 7,000 feet	. . . . .	lbs.
H 918.	Hazara, 7,000 feet	. . . . .	37
II 3164.	Dungagalli, Hazara, 7,000 feet	. . . . .	34
			...

3. *U. lancifolia*, Roxb. Fl. Ind. ii. 66; Kurz ii. 473; Gamble 72. Vern. *Lapi*, Nep.; *Thalai*, Burm.

A large tree. Bark brown, thick. Wood light red, hard. Pores small, usually surrounded by white tissue and joined by white concentric lines which are sometimes broken. Medullary rays fine to moderately broad, the distance between them about equal to the transverse diameter of the pores.

North-East Himalaya from Sikkim to Assam, Chittagong and Burma.

E 3343. Singtam, Darjeeling, 1,500 feet.

4. *U. integrifolia*, Roxb. Fl. Ind. ii. 68; Beddome t. 310; Brandis 431; Kurz ii. 473. *Holoptelea integrifolia*, Planch.; DC. Prodr. xvii. 164; Wight Ic., t. 1968. Vern. *Papri*, *khulen*, *arjân*, *rajân*, *kachâm*, Pb.; *Papar*, *kanju*, Kumaun; *Papri*, *dhamna*, *kúnj*, *karanji*, *chilbil*, *chilmil*, *kúmba*, *kúnja náli*, *kandru*, *begana*, Hind.; *Chilla* Banda; *Karinji*, Gondi; *Karanjel*, Kurku; *Aya*, Tam.; *Namli*, *navili*, *nali*, *pedda-nowli-eragu*, Tel.; *Wawali*, Mar.; *Ras bija*, Kan.; *Thapsi*, Mysore, Coorg; *Kaládri*, Hassan; *Dadahirilla*, Cingh.; *Myoukseit*, Burm.

A large deciduous tree. Bark  $\frac{1}{3}$  inch thick, whitish grey, exfoliating in long, irregular flakes, soft, with an offensive smell when fresh, like the leaves and branchlets. Wood light yellowish grey, moderately hard, no heartwood. Annual rings indistinct. Pores small, uniformly distributed, joined by very fine and often faint lines of soft texture, frequently filled with a snow-white substance, marked on a vertical section. Medullary rays fine, undulating, uniform, equidistant, visible on a radial section; the distance between the rays equal to the transverse diameter of the pores.

Sub-Himalayan tract from the Beas eastwards, Central and South India, Burma.

Growth moderately fast, averaging 6 rings per inch of radius, some specimens shewing as little as 2 rings. Weight, 39 lbs. per cubic foot. The wood is used for building, carts, and carving. The leaves are lopped for cattle fodder. An oil is extracted from the seed in the Melghát.

P 445.	Ajmere	. . . . .	lbs.
O 264.	Garhwal (1868)	. . . . .	42
O 3002.	" (1874)	. . . . .	46
O 392.	Oudh	. . . . .	41
C 1148.	Ahiri Reserve, Central Provinces	. . . . .	34
C 1181.	" "	. . . . .	37
B 1416.	Tharrawaddi, Burma	. . . . .	37
B 1419.	" "	. . . . .	42
			41

## 12 CELTIS, Tournefort

Contains about 8 species which are very difficult to distinguish cf Brandis, p 429 A rough key to the general characters of the leaves is however given, it may be useful in ascertaining the species

Leaves evergreen entire	<i>C Wightii</i>
Leaves semi-deciduous serrate	<i>C cinnamomea</i>
Leaves deciduous serrate—	
	<i>C eriocarpa</i>
	<i>C Hamiltonii</i>
Leaves penniveined—	
Leaves of perigonium obtuse	<i>C australis</i>
Leaves of perigonium acute	<i>C tetrandra</i>
Leaves with 3 nerves—	
Leaves sub-cordate at base	<i>C Roxburghii</i>
Leaves rhomboid	<i>C caucasica</i>

*C cinnamomea* Ldl, Kurz n 472 is a tree of Northern and Eastern Bengal,

Wood light-coloured, moderately hard, no heartwood, seasons well Annual rings in the species of Europe, Northern India and Bengal, distinctly marked by belts of large pores The pores in the outer portion of the annual ring small, and generally arranged in groups or oblique tails

1 *C Wightii*, Planchon, Beddome cexviii, Wight Ic t 1969 *Solenostigma Wightii*, Bl, Kurz n 471 Vern *Vella thorasay*, Tam, *Tella-kaka-mushti*, Tel

A small evergreen tree Wood greyish white, very hard, close-grained Annual rings indistinctly marked by a narrow belt without pores Pores small, enclosed in narrow, undulating, concentric, interrupted lines of soft tissue Medullary rays fine, numerous, uniform and equidistant

Mountains of South India Andaman Islands

Weight 53 lbs per cubic foot

D 1089 Madura Madras

lbs  
53

2. *C. australis*, Linn, Brandis 428 Vern *Kharak*, Simla, Kumaun, *Tagho, takhum*, Afg,

A moderate-sized deciduous tree Bark bluish grey Wood grey or yellowish grey, with irregular streaks of darker colour Annual rings marked by an irregular belt of moderate-sized and large pores Pores moderate sized and large, gradually getting smaller towards the outer limit of each annual ring, where they are very small and arranged in wavy, interrupted, concentric lines Medullary rays moderately broad and fine

Sulaiman and Salt Ranges Himalaya from the Indus to Bhutan ascending to 8500 feet Khasia Hills

Growth moderate 8 to 9 rings per inch of radius Weight, 47 lbs per cubic foot, Mathieu Fl For, p 257, gives 37 to 50 lbs The wood is tough and strong and is



used for oars, whip handles and for other purposes requiring toughness and elasticity. The tree is largely planted about villages in the North-West Himalaya for shade and fodder.

H 36. Julung, Simla, 5,000 feet . . . . . lbs.  
47

3. *C. tetrandra*, Roxb. Fl. Ind. ii. 63; Brandis 429; Kurz ii. 472; Gamble 72. *C. serotina*, Planch.; Beddome ccxviii. Vern. *Kúmsúm*, *sungsúm*, Lepcha; *Haktapatia*, Ass.

A tall tree. Wood greyish white, moderately hard. Pores numerous, frequently subdivided, those of the inner edge of each annual ring large, forming a narrow, porous belt; those of the outer portion moderate-sized and arranged in oblique wavy lines. Medullary rays moderately broad and fine, prominent on a radial section as long, narrow plates.

Outer Himalaya, from Kumaun eastwards, Western Ghâts.

Growth moderate, 5 to 10 rings per inch of radius. Weight, 36 to 37 lbs. per cubic foot. Used in Assam for planking and canoes.

E 669. Bamunpokri Forest, Darjeeling Terai . . . . . lbs.  
36  
E 707. Great Rangit Valley, Darjeeling . . . . . 37

4. *C. caucasica*, Willd.; Brandis 429. Vern. *Bather*, Pb.

A moderate-sized tree, with grey bark  $\frac{1}{4}$  inch thick. Wood light yellow, hard to very hard. Structure resembling that of *C. australis*, but the pores on the inner edge of each annual ring are very large, and consequently very prominent on a vertical section. Medullary rays broader and further apart than in *C. australis*.

Afghanistan, Beluchistan, Salt Range, Hazara, Kashmir.

Growth moderate, 10 rings per inch of radius. Weight, 44 lbs. per cubic foot.

H 932. Hazara . . . . . lbs.  
44  
H 3169. Dungagalli, Hazara . . . . .

### 13. SPONIA, Comm.

Wood light-coloured, no heartwood, soft or moderately hard. Pores small or moderate-sized. Medullary rays fine and moderately broad.

1. *S. orientalis*, Planchon; Beddome ccxix.; Brandis 430; Gamble 72. *Celtis orientalis*, Linn.; Roxb. Fl. Ind. ii. 65. *Trema orientalis*, Bl.; Kurz ii. 468. *S. Wightii*, Planch.; Beddome t. 311, and *S. amboinensis*, Dene (*S. velutina*, Planch.), are probably not specifically distinct. Indian Nettle Tree. Vern. *Badu manu*, C.P.; *Kooail*, Nep.; *Tugla*, Lepcha; *Param*, Meehi; *Jupong*, *phakram*, *jigini*, *sapong*, *sempak*, *amphak*, *opang* (see Agri-Horticultural Society of India Proceedings for November 1877), Ass.; *Mini*, Tam.; *Gada-nelli*, Tel.; *Gorklu*, Kan.; *Gol*, Mar.; *Rukni*, Baigas.

A small fast-growing and short-lived tree. Bark thin, greyish brown, with numerous lenticels. Wood light reddish grey, soft. Pores moderate-sized, often subdivided, uniformly distributed. Medullary rays fine, numerous, uniform, very prominent on a radial section, the distance between the rays generally equal to or greater than the transverse diameter of the pores.

Himalaya from Nepal eastwards, Bengal, Burma, Central and Southern India.

Growth extremely fast. The tree from which our specimen was cut, and which was growing in front of the Sivoke Forest House, had attained in five years a height of 25 ft. and a diameter of 12 inches at 10 ft. from the ground. The wood is good for gun-rafters of native *Amphal* cloth and Coong coffee. The same has been used in the same places, often in great profusion, and may be much utilized in plantations to help to keep down the grass jungle.

E 2446 Svoke, Darjeeling Teiaa

lbs  
28

2 *S. politoria*, Planch., Brandis 430, Gamble 72 Vern. *Bantamman*, *kunglu*, *khúri*, Pb., Jánn, *khasaroa*, *máru*, *bátu*, *banhária*, Hind.; *Akai*, *kháksi*, *koail*, Nep., *Tuksat*, Lepcha

A small evergreen tree. Bark smooth, or with longitudinal wrinkles, inner bark red. Wood white, moderately hard, splits and cracks in seasoning. Annual rings marked by a belt of firmer tissue on the outer edge of each ring. Pores small, often subdivided, uniformly distributed. Medullary rays fine and moderately broad.

Salt Range, Outer Himalaya, Oudh, Sikkim.

Growth very fast, 2 rings per inch of radius. Weight, 36 lbs per cubic foot. Wood and bark used in a similar way to those of *S. orientalis*. The leaves are used to polish wood and horn.

O 1369      Gonda, Oudh

36

ORDER XCIII PLATANÆ.

## 1 PLATANUS, TOWN

*P. occidentalis*, Linn.,  
and Brindis by less deeply  
slightly smaller fruit-heads  
cubic foot

1. *P. orientalis*, Linn ; Brandis 434 Vern. *Chinár*, Pers , Afgh. ;  
*Báru*, *buna*, *boin*, Kashmu

A                      inch thick, smooth, light or dark grey,  
tinge                  Wood white, hard, with a faint  
                             ngs marked by a band of firm texture with few pores on the outer edge of each ring. Pores very small, uniform, and uniformly distributed except in the outer band of the autumn wood. Medullary rays broad, equidistant, shewing on a radial section as glossy, irregular, wavy, shining plates.

1 in x 1 in gave an average weight of 388 lbs,  $P = 687$ . Mathieu gives 11 to

49lbs. It is used in Kashmir for boxes, trays, pen-cases and other articles, which are lacquered and painted. It has a pretty grain and may be recommended for cabinet-work.

H 922. Hazara . . . . . lbs.  
41

## ORDER XCIV. CASUARINACEÆ.

One genus, containing chiefly Australian trees, one species only extending northwards to India. Several other species, however, have been introduced and grown in India.

### 1. CASUARINA, Linn.

1. *C. equisetifolia*, Forster; Beddome cxxvi. ; Brandis 435 ; Kurz ii. 494. *C. muricata*, Roxb. Fl. Ind. iii. 519. The Beefwood of Australia. Vern. *Chouk*, Tam. ; *Serva*, Tel. ; *Kásrike*, Mysore ; *Tinyu*, Burm. ; *Aru*, Malay.

A large evergreen tree, with leafless drooping branches, and branchlets which are deciduous and perform the functions of leaves. Wood white, brown near the centre, very hard, cracks and splits. Pores moderate-sized, in radial and oblique lines. Medullary rays very fine, uniform, equidistant. Numerous wavy, concentric lines, composed of soft tissue and minute pores.

Coasts of Chittagong, Burma, the Malay Archipelago, North Australia and Queensland. Cultivated all over India, except in the North-Western portion of the Punjab.

The growth is fast, our specimen shews 3 to 4 rings per inch of radius. From Colonel Beddome's Report on the plantations in the North Arcot District, dated December 30th, 1876, the measurements of trees in two plantations were—

	Age.	Height.	Girth.
Veeringapuram plantation . . .	4 years	32 feet	24 inches at 3 feet.
Trivellam „ . . .	6 „	70-80 „	36-48 „ „

which would shew an average growth of 1 ring per inch of radius, or a girth of 6 feet at 22 years of age.

The wood is hard and heavy, and difficult to cut, and according to Skinner, No. 42 weighs 55 lbs. per cubic foot; our specimen gives 62 lbs. M. Sebert in 'Notice sur les Bois de la Nouvelle Calédonie' gives 63 lbs. Skinner gives P = 920. It has been largely planted in North Arcot, South Arcot, Madras and other districts of the Madras Presidency for fuel, for which it is excellent, but it requires to be near the sea-coast and to have water at the roots, at least 10 feet from the surface of the ground. Trees planted in sandy soil often suffer much from drought the first two or three years, the taproot then finds its way down to about 10 feet and reaching water the tree begins to thrive. It is of course best near the sea, but fine trees may be seen in places in Northern India, especially at Saharanpur and Umballa. Casuarina seems to coppice well, and undoubtedly is, in suitable localities, and considering its extremely quick growth and the qualities of its wood, one of the most important trees we have for fuel and other plantations.

E 2465. Calcutta . . . . . lbs.  
62

## ORDER XCV. EUPHORBIACEÆ.

We shall here follow the nomenclature used in Müller's and Boissier's Monographs of this large Order in the Prodromus of DeCandolle, but adding as Sub-Orders the two separate Orders described in Vol. XVI, viz., *Daphniphyllaceæ* and *Buraceæ*.

The Order then contains 57 genera belonging to 9 tribes. It contains many important species, though with the exception of *Bischoffia* and *Briedelia* and, of

course, Boxwood, few are specially remarkable for their timber Oils are given by  
Phyl.  
while

## SUB ORDER I EUPHORBIACEÆ

Tribe	I —Phyllanthææ . . .	<i>Actephyla, Andrachne, Sauropus, Antidesma, Phyllanthus, Melanthesopsis, Breynia, Putranjiva, Securinega, Baccaurea, Apocosa, Hymenocardia, Bischoffia, Cyclostemon, Hemicyclia</i>
„	II —Brideheæ	<i>Briedelia, Cleistanthus, Lebecheopsis</i>
„	III —Crotonææ	<i>Croton</i>
„	IV —Acalyphææ .	—

## II — Bridehead

### III — Crotonæ

IV — Acalypha

V — Hippomanes

VI—Dalechampiæ

" VII —Euphorbiæ

*Maçaranga Ricinus Homonoya*  
*Bennettia, Microdesmus Manihot, Jatro-*  
*pha, Trigonostemon Givotia, Ostodes,*  
*Codiaeum, Chacocarpus, Mischodon,*  
*Baliocarpum, Gelonium, Ercæcaria*  
*Dalechampia*  
*Pedilanthus, Euphorbia*

## SUB ORDER II DAPHNIPHYLLACEÆ.

Tribe VIII—Daphniphyllæ *Daphniphyllum.*

SUB ORDER III BUXACEÆ

Tribe IX—Buxæ *Buxus, Sarcococca*

*Actephila* contains 4 or 5 large shrubs or small trees *A. excelsa*, Dalz., Beddome cxxxix, is a small tree of the Western Ghats *A. Thomsoni*, Muill Arg., Beddome exc, is a shrub of Mysore and the Carnatic *A. javanica*, Miq., and *A. puberula*, Kurz ii 340 1, are shrubs of the Andaman Islands *Sauropus* contains 6 species of which *S. alluani* Bl. Kurz ii 349 Gamble 69

Arg ,  
of the  
456,  
and ,  
tree  
hard,  
arm ,  
rests

, Beddome  
*C. egland-*  
dd, of the  
*an bokul,*  
ngal and  
*H. elata,*  
e Western

*H. andaviaria*, W. and A., is a tree of

rz n 377 (*A. triloba*, Forst.,  
e introduced from the Malay  
in many parts of South India.

It is called the 'Belguum Walnut,' and is so called from the nuts resembling the walnut in flavour. These nuts contain about 50 per cent of oil, which is extracted and used for food and for burning. In M. Sebert's 'Notice sur les bois de la Nouvelle Calédonie,' the wood is said to be white, soft, light and of bad quality, and to have a mean weight of 38 lbs. per cubic foot. *A. cordata*, Müll. Arg., is found in Nepal. *Agrostistachys indica*, Dalz.; Beddome ccv. (*A. longifolia*, Kurz ii. 377) is a small evergreen tree of the Western Ghâts, Ceylon, Burma and the Andamans. *Sarcoclinium longifolium*, Wight; Beddome ccv., is a small tree of the Nilgiri Hills and Ceylon, from 4,000 to 6,000 feet. *Sumbavia macrophylla*, Müll. Arg., Kurz ii. 376, is an evergreen tree of the tropical forests of Burma. Of *Calodiscus*, Kurz describes 5 new species from Burma, all shrubs. *Calodepas calycinum*, Beddome ccvii. t. 320. Vern. *Kãtpira*, is a small hard-wooded tree of the Tinnevely Hills. *Cephalocroton* contains 2 species: *C. leucocephalus*, Baill.; Beddome ccvi., of the Nilgiris; and *C. indicus*, Beddome t. 261, a moderate-sized tree of the Western Ghâts, said to give a good building timber. Of *Symphyllia* 2 species are found: *S. mallotiformis*, Müll. Arg.; Beddome ccviii., in the Nilgiris; and *S. silhetana*, Baill.; Kurz ii. 378, in the Khasia Hills, Eastern Bengal and Tenasserim. *Claoxylon* contains 3 and *Acalypha* 1 (*A. fruticosa*, Forsk.) shrub of the forests of Burma. *Tragia* contains 2 and *Cnesmone* 1 (*C. javanica*, Bl.) climbing shrubs of Burma. *Alchornea* contains 3 shrubs: *A. mollis*, Müll. Arg., of Nepal; *A. rugosa*, Müll. Arg., of Tenasserim and the Andamans, and *A. tiliifolia*, Müll. Arg.; Kurz ii. 386; Gamble 71, of Sikkim, the Khasia Hills, Sylhet, Tenasserim and the Andamans. *Cleidion javanicum*, Bl.; Beddome t. 272; Kurz ii. 390; Gamble 70, is a tree of Northern and Eastern Bengal, South India and Burma.

*Bennettia Wallichii*, R. Br. (*Galearia Wallichii*, Kurz ii. 407) and *Microdesmis caseariaefolia*, Planch.; Kurz ii. 408, are small trees of the forests of Tenasserim. *Manihot utilisima*, Pohl.; Kurz ii. 408. Vern. *Pulu pinan myouk*, Burm., is a shrub of tropical America, introduced and cultivated in Burma. It yields 'the manioc,' or 'cassava' meal and 'tapioca.' *Trigonostemon* contains about 6 species, the chief of which is *T. Lawianus*, Nimmo; Beddome t. 273, a small tree of the Western Ghâts and Ceylon. *Codiaeum* contains 4 species: *C. umbellatum*, Müll. Arg.; Beddome ccxiii. of the Western Ghâts, one species in Burma and two in the Andaman Islands. This genus gives the ornamental variegated-leaved plants called 'Crotons,' now so much cultivated in Indian gardens. *Mischodon zeylanicus*, Thw.; Beddome t. 290. Vern. *Tumana*, Cinch., is a handsome large tree of Ceylon, with good timber; it has been found by Beddome in Tinnevely. *Baliospermum* contains 3 undershrubs of Northern and Eastern Bengal, the commonest of which, *B. montanum*, Müll. Arg. (*Croton polyandrum*, Roxb. Fl. Ind. iii. 682; Gamble 70). Vern. *Hakun*, Hind.; *Konda-amadum*, Tel.; *Poguntig*, Lepcha, extends to South India and Burma.

*Dalechampia scandens*, Linn.; Kurz ii. 400, is a climbing shrub of Burma, *Pedilanthus tithymaloides*, Poir.; Kurz ii. 418, is a short rather fleshy shrub often cultivated in Burma. *Daphniphyllum glaucescens*, Bl.; Beddome ccxvii. t. 288. Vern. *Nir-chappay*, Burghers, is a handsome tree of the Western Ghâts; and *D. himalayense*, Müll. Arg. Vern. *Raktchandán*, *rakt angliá*, Kumaun, is a tree of the Himalaya from Kumaun eastwards and the Khasia Hills found above 5,000 feet altitude.

Several exotic trees belonging to this family have been introduced, and an attempt made at their cultivation in India. *Hevea brasiliensis*, Müll. Arg.; and other species of *Hevea* give the Brazilian caoutchouc. That named is the Para rubber, and is now being grown for distribution in the Botanic Gardens, Calcutta, from plants received in 1877. The 'Ceara' caoutchouc, a species of *Manihot*, probably *M. Glaziovii*, is also being grown. The very interesting account of their collection by Mr. Cross may be found at vol. iv, No. 1, p. 5 of the 'Indian Forester' for 1878, and an account of their state on arrival in India in Dr. King's annual report of the Botanic Gardens at Calcutta for the year 1877-78.

The great majority of the woody Euphorbiaceæ the wood of which is here described, belonging to the following genera—*Antidesma*, *Baccaurea*, *Bischofia*, *Cleistanthus*, *Eccaccaria*, *Homonoya*, *Jatropha*, *Lebidieropsis*, *Mucaranga*, *Mallotus*, *Ostodes*, *Putranjiva*, *Trewia*—may, as regards the structure of their wood, be said to belong to one type, which is characterised as follows:

Very fine, or extremely fine, and closely packed medullary rays  
Pores small or very small, often in radial lines

The genera *Phyllanthus* and *Briedelia* differ by having their medullary rays broader and further apart

The genera *Securinega*, *Andrachne*, *Bizus* and *Sarcococca* have very small or extremely small pores, and fine to extremely fine medullary rays

*Croton* and *Chatocarpus* have extremely fine and closely packed medullary rays, but the wood is marked by wavy concentric lines, which are wanting in other genera of Euphorbiaceae

*Givotia* has scanty pores and short distant medullary rays

Of these genera only *Lebidieropsis* and *Bischofia* have a distinct heartwood, some of the others have darker coloured wood near the centre

## 1 ANDRACHNE, Linn

Two shrubs *A. telephioides*, Linn, Brandis 457 is a small undershrub of the Punjab Salt Range

1 *A. cordifolia*, Mull Arg, Brandis 456 Vern *Kurkhi*, *gurguli*, *Jhelim*, *Bersu*, *Chenab*, *Barotri*, *madare*, *Ravi*, *Muthar*, *chirmutti*, *pin* *Beas*, *Tsatin*, *Sutlej*

A small shrub Wood white, moderately hard close grained Pores very small and extremely small, larger and more numerous in the inner belt of the annual rings Medullary rays extremely fine, very numerous

North West Himalaya from the Indus to Nepal ascending to 8000 feet

Weight 45 lbs

H 2945 Jander Sutlej Valley 3500 feet

lbs  
45

## 2 ANTIDESMA, Burm

About 14 species *A. refractum* Mull Arg is a small tree of Sikkim at about 2000 feet *A. nigricans* Tul and *A. simile* Mull Arg are small trees of Sylhet and

Wood hard, smooth, apt to split and warp Pores small, numerous Medullary rays of two classes, very fine, and moderately broad

1 *A. Ghæsembilla*, Gaertn, Beddome cc, Brandis 446, Kurz 11 308 *A. pubescens*, Willd, and *A. paniculata*, Roxb 11 Ind 11 769, 770 Vern *Khudi jamb*, *limtoa*, Beng, *Urtoa* *Hazaribagh*, *Pulsur*, *polar*, *jana pa laseru*, *pollar*, Tel, *Jondri*, Mar, *Byarsu*, Burm, *Boo ambilla*, Cingh

A small deciduous tree with grey or pale brown bark,  $\frac{1}{2}$  inch thick, with a few deciduous scales Wood red, with darker coloured heartwood smooth, hard, close and even grained Annual rings indistinctly marked by concentric lines Pores small and moderate sized, uniformly distributed Medullary rays of two sizes, few moderately broad rays with numerous fine rays between them, prominent on a radial section

Nepal Oudh Bengal Burma Chandra district and South India

Weight 19 lbs per cubic foot The leaves are eaten in Bengal

C 1161.	Ahiri Reserve, Central Provinces	lbs.
B 2246.	Andaman Islands (1866)	46
		52

2. E 2430 (46 lbs.) from the Chenga Forest, Darjeeling, has a similar structure. It is marked *A. Bunias*, Spr.; Beddome cc.; Kurz. ii. 358; Gamble 69. Vern. *Himalcheri*, Nep.; *Kantjer*, Lepcha. A small tree of Northern and Eastern Bengal, South India and Tenasserim.

3. *A. Menasu*, Müll. Arg.; Kurz ii. 360; Gamble 69. Vern. *Kumbyung*, *tungcher*, Lepcha; *Kin-pa-lin*, Burm.

A small tree. Bark thin. Wood red, structure similar to that of *A. Ghæsembilla*, but the pores smaller and the medullary rays finer.

Sikkim, Khasia Hills, Burma and the Andaman Islands.

Weight, 52 lbs. per cubic foot. Fruit eaten.

E 2431.	Chenga Forest, Darjeeling	lbs.
		52

4. *A. diandrum*, Tulasne; Beddome cci.; Brandis 447; Kurz ii. 360; Gamble 69. *Stilago diandra*, Roxb. Fl. Ind. iii. 759. Vern. *Amlī*, *amāri*, *sarshoti*, *gūr mussureya*, *ban mussureya*, *dhakki*, Hind.; *Mutta*, Beng.; *Patimil*, Nep.; *Kantjer*, Lepcha; *Nuniāri*, Uriya; *Pellagumudu*, Tel.; *Masūr bauri*, Gondi; *Kin-pa-lin*, Burm.

A small tree with smooth grey bark; inner bark pale red, fibrous. Wood pinkish grey, hard, close-grained. Pores small and very small, uniformly distributed. Medullary rays of two sizes, moderately broad and very fine, wavy. Annual rings marked by a fine line.

Garhwal, Kumaun, Oudh, Bengal, South India and Burma.

Weight, 41 lbs. per cubic foot. The leaves are acid and are eaten; they resemble sorrel and are made into chutni. The fruit is eaten.

O 1368.	Gonda, Oudh	lbs.
O 1464.	Bahraich, Oudh	42
		40

### 3. PHYLLANTHUS, Linn.

A large genus formed by the grouping together of several genera or sections, such as *Glochidion*, *Phyllanthus*, *Emblīca*, etc. It contains 43 Indian species of trees or shrubs, which are thus arranged by Müller:—

#### SECTION I. EUGLOCHIDION.

<i>P. multilocularis</i> , Müll. Arg.	Bengal, Burma.
( <i>P. calocarpus</i> , Kurz)	Andamans.
<i>P. coccineus</i> , Müll. Arg.	Bengal, Burma.
<i>P. zeylanicus</i> , Müll. Arg.	South India, Andamans.
( <i>P. andamanicus</i> , Kurz)	Andamans.
<i>P. nitidus</i> , Müll. Arg.	South India.
<i>P. lanceolarius</i> , Müll. Arg.	North India, Bengal, Burma.
<i>P. tomentosus</i> , Müll. Arg.	South India.
<i>P. canararus</i> , Müll. Arg.	Ditto.
<i>P. Helferī</i> , Müll. Arg.	Burma, Andamans.
<i>P. subscandens</i> , Müll. Arg.	Burma.

#### SECTION II. HEMIGLOCHIDION.

<i>P. Hohenackeri</i> , Müll. Arg.	South India.
<i>P. fagifolius</i> , Müll. Arg.	Bengal, Burma, South India.
<i>P. nepalensis</i> , Müll. Arg.	North India, Bengal.

<i>P Thomsoni</i> Mull Arg	Bengal
<i>P sphaerogynus</i> Mull Arg	Burma
<i>P asperus</i> Mull Arg	South Ind a
<i>P sylhetica</i> s Mull Arg	Bengal
<i>P assamicus</i> Mull Arg	D tto
<i>P glaucifolia</i> s Mull Arg	Burma
<i>P neilgherrensis</i> Mull Arg	South India
<i>P arboreus</i> Mull Arg	D tto
<i>P stellatus</i> Petz	Bengal
<i>P malabaricus</i> Mull Arg	South Ind a
<i>P Perrottetian</i> s Mull Arg	Ditto
<i>P velutinus</i> Mull Arg	Bengal South India
<i>P Daltoni</i> Mull Arg	Be gal Burma South Ind a
<i>P Heyneanus</i> Mull Arg	South Ind a
<i>P bicolor</i> Mull Arg	Bengal
<i>P khisius</i> Mull Arg	Ditto
( <i>P dasystylus</i> Kurz)	Burn a
( <i>P leostylus</i> kurz)	Ditto

### SECTION III KIRGANELIA

*P. reticulatus* Mull Arg All Ind a and Burma

## SECTION IV EMBLICA

<i>P. Emblca</i> Linn	All Ind a and Burma
<i>P. polyphallus</i> Willd	South India
<i>P. baobotryoides</i> Mull Arg	B ngal Burma
<i>P. columnaris</i> Mull Arg	Burma

## SECTION V PARAPHYLLANTHUS

*P. juniperinoides* Mull Arg South India

## SECTION VI CICC

<i>P. distichus</i> Mull Arg	India Burma Andaman
<i>P. cyanospermus</i> Mull Arg	South India
<i>P. indicus</i> Mull Arg	Iditto
( <i>P. albicinctus</i> H. z)	Bur a
( <i>P. macrocephalus</i> Huiz)	Iditto

Thus it will be seen that 4 species are found in North West India 16 in Northern and Eastern Bengal 21 in South India 18 in Burma and 5 in the Andaman Islands. Few of them are of much importance. *P. lanceolarius* Mull. Ag. Brandis 453, Gamble 68 (*Glochidion lanceolarium* Dalz. Beddome exen. Kurz 313 *Bradleya*

$\pi$        $\lambda$     $\lambda$     $\pi$     $\lambda$        $\Pi$     $\lambda$     $\Sigma$     $\delta_{\text{int}}$        $\Gamma_0$     $\lambda_{\text{int}}$     $\Gamma$     $\lambda$     $\pi$        $\lambda$     $\pi$     $\delta_{\text{int}}$

1

Wood red, splits and warps No heartwood Pores moderate sized, subdivided Medullary rays moderately broad, distant, prominent on a vertical section, giving the wood a mottled appearance

1 *P. Emblica*, Linn., Roxb Fl Ind m 671, Beddome t 258



Brandis 454; Gamble 68. *Cicca Emblica*, Kurz ii. 352. Vern. *Ambal*, *ambli*, Pb.; *Daula*, *amla*, *amblika*, *aura*, *aola*, *aunra*, Hind.; *Aunla*, Nep.; *Suom*, Lepcha; *Amla*, *ambolati*, *amulati*, Beng.; *Ambari*, Gáro; *Amluki*, Ass.; *Alá thanda*, Cuttack; *Nilli*, *milli*, *nalli*, *avnri*, *usir*, *lalla*, Gondi; *Aunre*, Kurku; *Nelli*, *nellekai*, Tam.; *Osirka*, *usri*, *asereki*, Tel.; *Nelli*, *nilika*, Kan.; *Ohalu*, *gondhona*, Uriya; *Aonli*, Mar.; *Nelli*, Cingh.; *Shabju*, *taska*, Burm.

A moderate-sized deciduous tree. Bark somewhat less than  $\frac{1}{3}$  inch thick, grey, exfoliating in small irregular patches, inner substance red. Wood red, hard, close-grained, warps and splits in seasoning. No heart-wood, annual rings not distinct. Pores small and moderate-sized, uniformly distributed, often subdivided or in short radial lines. Medullary rays moderately broad and broad, the distance between two rays generally greater than the transverse diameter of the pores. Medullary rays very prominent on a radial section, giving the wood a handsome mottled appearance.

Dry forests of India and Burma.

The annual rings are not sufficiently distinct in our specimens for counting. Aikin in Wallich's list gives 2·7 rings per inch of radius.

The weight and transverse strength have been determined by the following experiments:—

Experiment by whom made.	Year.	Wood whence procured.	Weight.	No. of experiments.	Size of bar used.	Value of P.
					Ft. in. in.	
Puckle . . . . .	1859	Mysore . . . . .	67	2	2 × 1 × 1	975 (P)
Kyd . . . . .	1831	Assam . . . . .	45	...	.....	617
Skinner, No. 105 . . . . .	1862	South India . . . . .	46	...	.....	562
Cunningham . . . . .	1854	Gwalior . . . . .	46	2	2 × 1 × 1	559
R. Thompson . . . . .	1863	Central Provinces . . . . .	45	...	.....	...
A. Mendis . . . . .	1855	Ceylon . . . . .	49	...	.....	...
Brandis (No. 93) . . . . .	1862	Burma . . . . .	35	...	.....	...
Warth . . . . .	1878	Different Provs. . . . .	51	8	.....	...

The wood is durable under water, and is used for well-work; also for agricultural implements, building and furniture.

The bark is used for tanning and in medicine; chips of the wood are said to clear muddy water. The fruit is the Emblic Myrobolam, and is used as a medicine, for dyeing, tanning, and for food and preserves. It gives a gum, which is not used.

P 104.	Bhajji, Simla, 3,000 feet	lbs.
P 438.	Ajmere	56
O 252.	Garhwal (1868)	...
O 539.	Dehra Dún	49
E 580.	Khookloong Forest, Darjeeling Terai	48
E 2432.	Bamunpokri, Darjeeling Terai	56
C 1126.	Ahiri Reserve, Central Provinces	48
C 2738.	Moharli Reserve, Central Provinces	51
C 841.	Bairagarh Reserve, Berar	56
C 2774.	Melghát, Berar	45
No. 61.	Ceylon Collection	...
		56

2. *P. Thomsoni*, Müll. Arg.; Gamble 68. Vern. *Latikat*, Nep.

A small tree. Wood red, structure the same as that of *P. Emblica*.

Sikkim and the Khasia Hills

Weight 42 lbs per cubic foot

E 2434 Bamunpokri Darjeeling Terai

lbs

42

3 *P. bicolor*, Mull Arg, Bhandis 453, Gamble 68 Vein *Laticat*, *lakrikat*, Nep, *Asir*, *telrikari*, *Lejcha*

An evergreen tree, with thin grey bark Wood red or reddish grey, hard Pores small and moderate sized uniformly distributed Medullary rays fine and moderately broad, numerous, very prominent on a radial section, giving the wood a mottled appearance

Nepal Sikkim and Khasia Hills ascending to 7000 feet

Growth moderate 8 rings per inch of radius

Weight 37 to 47 lbs per cubic foot

E 685 Sepoydura forest, Darjeeling 5500 feet

lbs

37

E 2433 Takdah Forest Darjeeling 6000 feet

47

4 *P. reticulatus*, Poiret, Beddome exs, Bhandis 453, Gamble 68 *P. multiflorus*, Roxb Fl Ind iii 664 *Cicca reticulata*, Kurz ii 354 Vein *Paigule*, *mahli*, Hind, *Nella purududu*, *phulsa*, Tel, *Welkyla*, Cingh

A straggling shrub Bark brown, thin Wood white or greyish white, hard, close grained Pores small, scanty more numerous in the spring wood, marking thus the annual rings Medullary rays fine, numerous, wavy

Common in most parts of India and Burma especially along river banks

E 3362 Dhuggur W Duars

## 4 PUTRANJIVA, Wall

1. *P. Roxburghii*, Wall, Beddome t 275, Bhandis 451, Kurz ii 366 *Nageria Putranjiva*, Roxb Fl Ind iii 766 Vein *Putayan*, Pb, *Jia puta*, *joti*, *juli*, *puta jiva*, *patji jivputrak*, *patigia*, Hind, *Karupale*, Tam, *Kadravira*, Tel, *Poigilam*, Mal, *Jewan putr*, Mai, *Toukyap*, Burm

A moderate sized evergreen tree with pendent branches Bark dark grey Wood grey, shining, moderately hard, close grained Annual rings marked by prominent concentric lines Pores small to moderate-sized, in radial lines, between closely packed, uniform, fine, medullary rays Very numerous, very fine transverse bars

Sub Himalayan tract from the Clenab eastwards Oudh Bengal Burma and South India

O 1459 Bahraich Oudh

lbs

O 1177 Gonda Oudh

43

E 5169 Calcutta

19

9

## 5. SECURINEGA, Juss.

Three species. *S. grisea*, Müll. Arg., is a shrub of the Khasia Hills.

1. *S. obovata*, Müll. Arg.; Beddome excvii.; Brandis 455; Gamble 68. *Phyllanthus retusus* and *virens*, Roxb. Fl. Ind. iii. 657, 659. *Cicca obovata*, Kurz ii. 354. Vern. *Dalme*, *dháni*, *bakarcha*, *ghari*, *gwala*, *darim*, Hind.; *Iktibi*, Lepcha; *Ukieng*, *thaka*, Mechi; *Kodarsi*, Mar.; *Korchi*, Gondi; *Yae-chinya*, Burm.

A small tree. Bark rusty or reddish brown. Wood reddish yellow, close-grained. Annual rings marked by a white line. Pores small, numerous, uniformly distributed. Medullary rays fine, the distance between the rays greater than the transverse diameter of the pores.

Suliman Range, Sub-Himalayan tract and Outer Himalaya ascending to 5,000 feet, Eastern Bengal, Central and South India and Burma.

Growth slow, 14 to 16 rings per inch of radius. Weight, 52 lbs. per cubic foot. Wood durable, used for agricultural implements. Bark astringent, used to intoxicate fish.

H 2941.	Jander, Sutlej Valley, 3,000 feet	.	.	.	.	.	.	lbs.
P. 3247.	Ajmere	.	.	.	.	.	.	52
		.	.	.	.	.	.	...

2. *S. Leucopyrus*, Müll. Arg.; Beddome excvii.; Brandis 456; Gamble 68. *Phyllanthus Leucopyrus*, Roxb. Fl. Ind. iii. 658. *Cicca Leucopyrus*, Kurz ii. 353. Vern. *Pera pastawane*, Afg.; *Kakún*, *rithei*, *girthan*, *gargas*, *bháthi*, *bata*, *vanúthi*, *girk*, Pb.; *Hartho*, *aintha*, North-Western Provinces; *Kiran*, Sind; *Challa manta*, *sále manta*, Central Provinces; *Achal*, Nep.

A large shrub or small tree. Bark smooth, reddish brown, with few vertical cracks. Wood pink, hard, close-grained. Pores small, often subdivided or in short radial lines, numerous, uniformly distributed. Medullary rays very fine and fine, numerous, bent where they touch the pores.

Outer Himalaya, ascending to 5,000 feet, throughout India and Burma. Wood only used as fuel.

E 3319. Pankabari, Darjeeling, 2,000 feet.

E 3282. Sitapahar Reserve, Chittagong.

## 6. BACCAUREA, Lour.

Müller describes 6 species: *B. affinis*, Müll. Arg. and *B. parviflora*, Müll. Arg.; Kurz ii. 357, from South Tenasserim; *B. propinqua*, Müll. Arg., from Sylhet; *B. courtallensis*, Müll. Arg., and *B. flaccida*, Müll. Arg., from South India.

1. *B. sapida*, Müll. Arg.; Beddome t. 280; Kurz ii. 356; Gamble 69. *Pierardia sapida*, Roxb. Fl. Ind. ii. 254. Vern. *Lutco*, Hind.; *Kala bogoti*, Nep.; *Sumbling*, Lepcha; *Latecku*, Ass.; *Koli kuki*, Kan.; *Kanaizu*, Magh; *Kanazo*, Burm.

A moderate-sized evergreen tree, with thin grey corky bark. Wood greyish brown, soft, liable to split badly. Pores small, in short radial lines. Medullary rays moderately broad to broad, the distance between the rays being from one to three times the transverse diameter of the pores. Wood cells very large, arranged in transverse lines which have the appearance of innumerable short fine bars across the rays.

Bengal, Assam, Burma, and Andaman Islands.

Weight, according to Brandis' Burma List of 1862, No 97, 61 lbs, Wallich, No 154, 38 lbs; our specimens average 42 lbs. The wood is not used. The fruit is much eaten, it is acid and pleasant, and is called '*Lutqua*'. The leaves are used in Northern Bengal and Assam for dyeing.

					lbs
E 1265	Tezpur, Assam	.	.	.	42
B 2562	Burma (1862)	.	.	.	44
B 3145	♂ Magayee, Burma	.	.	.	42
E 3146	♀ " "	.	.	.	43
B 2686	Tavoy (Wallich, 1828)	.	.	.	41
B 2720.	" "	.	.	.	41

## 7. APOROSA, Bl.

Contains eight species. *A. villosa*, Baill, Kurz ii 361 Vern *Ye mein*, Burm, is a tree of Burma whose bark is used for dyeing red, and which gives a red resin. *A.*

tree of Northern and Eastern Bengal and Burma.

This last has been identified with the tree producing the 'Coco wood' of commerce, generally supposed to come from the West Indies.

No 2925 is the Coco wood. It has a dark brown, very hard, close grained wood, with white sapwood, and resembles that of *Homonoya* (see page 361) in structure. It weighs 79 lbs per cubic foot.

The wood of *Aporosa dioica* should be carefully examined to prove that the Indian tree gives a timber similar to Coco-wood.

## 8. BISCHOFFIA, Bl.

1. *B. javanica*, Bl, Beddome t 259, Brandis 446; Kurz ii 355; Gamble 69. *Andrachne trifoliata*, Roxb. Fl Ind. iii 728. Vern. *Kein*, *koisa*, *urum*, Hind.; *Kainjal*, Nep.; *Sinong*, Lepcha; *Taisok*, *urum*, Mechi; *Uriam*, Ass; *Bolzurn*, Gáro; *Joki*, Cachar; *Boke*, Bombay; *Thondi*, Tam.; *Goiarnellu*, Hassan, *Modagerri lembu*, Tinnevely.

A deciduous tree. Bark rough, dark grey with a brown tinge, exfoliating in angular scales. Wood red, rough, moderately hard, with a small darker-coloured heartwood. Pores moderate sized, in short radial lines. Medullary rays moderately broad and very fine, the distance between the broad rays being from one to three times the transverse diameter of the pores.

Kumaun, Garhwal, Oudh, Gorakhpur, Bengal, South India and Burma.

	Weight, foot.
	99 of
	estimated
	Beddome
	called 'Red
Cedar.	

O 1374.	Gonda, Oudh	.	.	.	.	.	.	lbs.
E 654.	Bamunpokri, Darjeeling Terai	.	.	.	.	.	.	44
E 1257.	Tezpur, Assam	.	.	.	.	.	.	53
E 2191.	Nowgong, Assam	.	.	.	.	.	.	47
E 2467.	Calcutta (sapwood)	.	.	.	.	.	.	46
		.	.	.	.	.	.	36

## 9. BRIEDELIA, Willd.

About 7 species. *B. ovata*, Dene; Kurz ii. 368, is a small tree of Tenasserim and the Andamans. *B. Hamiltoniana*, Müll. Arg., is a small tree with two varieties, one found in Behar, the other on the Bombay Ghâts. *B. stipularis*, Bl.; Beddome cci.; Brandis 449; Kurz ii. 369; Gamble 69 (*B. scandens*, Roxb. Fl. Ind. iii. 736) Vern. *Madlatáh*, *undergúpa*, Oudh; *Lilima*, Nep.; *Dúnkibúra*, Tel.; *Kihur*, *kohi*, Ass.; *Harinhara*, Beng; *Sin-ma-no-pyin*, Burm., is a large climbing shrub of most parts of India and Burma, with a dark heartwood; it is used for fuel in the Sundarbans. *B. dasycalyx*, Kurz ii. 369, is a climber of the forests of Burma.

Heartwood grey or olive brown, seasons well. Pores small to moderate-sized. Medullary rays fine or moderately broad.

1. *B. retusa*, Sprengel; Beddome t. 260; Brandis 449; Kurz ii. 368; Gamble 69. *B. crenulata*, Roxb., and *B. spinosa*, Willd.; Roxb. Fl. Ind. iii. 734, 735. Vern. *Pathor*, *mark*, Pb., *Khaja*, *kassi*, *gauli*, Hind.; *Lamkana*, Ajmere; *Angnera*, Banswara; *Asana*, Mar.; *Geio*, Nep.; *Pengji*, Lepcha; *Nanda*, Rajbanshi; *Katakuchi*, Meehi; *Kashi*, Gáro; *Kamkú*, Chittagong; *Kosi*, Uriya; *Mulu-vengay*, *kamanji*, Tam.; *Koramanau*, *dudi máddi*, *koramadi*, *duriamadi*, Tel.; *Kassei*, Gondi; *Karka*, Kurku; *Gúnjan*, *kati ain*, Mar., Bhíl; *Asuna*, *gojé*, Kan.; *Adamarathu*, Tinnevely; *Tseichyee*, Burm., *Katta kaala*, Cingh.

A large deciduous tree, with thorns on the bark of young stems. Bark  $\frac{1}{4}$  inch thick, grey or brown, rough with longitudinal cracks and exfoliating in long irregular plates. Sapwood small; heartwood grey to olive brown, close-grained, seasons well, moderately hard, the annual rings marked by concentric lines. Pores uniformly distributed, moderate-sized, often in short radial lines. Medullary rays numerous, uniform and equidistant, moderately broad, visible on a radial section as rough, narrow plates; the distance between two rays equal to, or less than, the transverse diameter of the pores. This wood has a mottled grain and takes a beautiful polish.

Sub-Himalayan tract, from the Chenab eastwards, ascending to 3,600 feet, Oudh, Bengal, Central and South India, Burma.

Growth fast, our specimens shewed an average of 5-6 rings per inch of radius. Weight, Skinner, No. 291, gives 60 lbs.; R. Thompson, 54 lbs.; Brandis, No. 23, Burma List, 1862, 66 lbs.; the average of our specimens is 50 lbs. according to Dr. Warth's weighings of specimens. Skinner gives  $P=892$ . This is, probably, Kyd's *B. stipularis*, Vern. *Kohi*, Ass., weight 64 lbs.,  $P=525$ . Wood durable, used for cattle-yokes, agricultural implements, carts and building. It stands well under water. The bark is used for tanning, the fruit eaten, and the leaves cut to feed cattle.

P 461.	Ajmere	.	.	.	.	.	.	lbs.
O 259.	Garhwal (1868)	.	.	.	.	.	.	48
O 3001.	" (1874)	.	.	.	.	.	.	45
O 1480.	Kheri, Oudh	.	.	.	.	.	.	43
O 347.	Gorakhpur (1868)	.	.	.	.	.	.	61
C 1174.	Abiri Reserve, Central Provinces	.	.	.	.	.	.	47
		.	.	.	.	.	.	55

C 840	Bairagarh Reserve, Berar	lbs 63
C 2765	Melghat Berar	45
E 645	Sepoydura Darjeeling 5 000 feet	53
E 619	Bamunpokri Darjeeling Fera	56
E 2428	, ,	46
B 3074	Burma (1862)	46
B 1431	Tharrawaddy Division Burma	56
No 43	Ceylon Collection	44
No 68	, ,	38

2. *B. montana*, Willd , Roxb. Fl Ind iii 730, Beddome cat , Brandis 450, Gamble 70 Vern *Kargnalia*, *khaja*, *geia*, *kusi*, Hind , *Geio*, Nep , *Kaisho*, Ass , *Patenga*, Tel

A moderate sized deciduous tree Wood grey, beautifully mottled , annual rings distinctly marked by darker and firmer wood on the outside of each ring Pores small and moderate sized, often in radial lines, the transverse diameter of the pores being generally less than the distance between the fine and uniformly distributed medullary rays, which are prominent on a radial section

Sub Himalayan tract from the Jhelam eastwards ascending to 4 000 feet Oudh, Bengal

Growth fast 4 rings per inch of radius Weight 46 to 59 lbs per cubic foot, but the heavier specimen was perhaps not sufficiently seasoned Wood very similar to that of *B. retusa* and might be used for the same purposes The leaves are lopped for cattle fodder

O 1375	Gondri Oudh	lbs 59
C 199	Mandla, Central Provinces (1870)	46

3 *B. tomentosa*, Bl , Kurz ii 367, Gamble 70 *B. lanceafolia*, Roxb Fl Ind iii 737 Vern *Sibri*, Nep , *Muntet*, Lepcha , *Sirai*, *mindri*, Beng

A small evergreen tree Wood light olive brown, hard, close grained Pores small, often subdivided, enclosed in rounded patches of soft tissue, which are generally arranged in oblique, undulating lines, the transverse diameter is greater than the distance between the very fine, very numerous, uniform and equidistant medullary rays

North East Himalaya ascending to 2 000 feet Eastern Bengal and Burma  
Weight 64 lbs per cubic foot

E 1397	Chittagong	lbs 64
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## 10 CLEISTANTHUS, Hook f

About 7 species *C. patulus* Mull Arg *C. malabaricus* Müll Arg and

1. *C. myrianthus*, Kurz ii 370 Vern *Mo man tha*, Burm

A moderate sized evergreen tree Wood moderately hard, reddish grey Pores small, numerous, often subdivided Medullary rays fine, very numerous, closely packed

Tropical forests of Burma and the Andaman Islands

B 2471	Andaman (Kurz 1866)	lbs 41
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## 11. LEBEDIEROPSIS, Müll. Arg.

1. *L. orbicularis*, Müll. Arg.; Beddome ccciii.; Brandis 450. *Cluytia collina*, Roxb. Fl. Ind. iii. 732. Vern. *Garrar*, *qārārī*, Hind.; *Karada*, Uriya; *Korsi*, *wodesha*, *kadishen*, *korshe*, Tel.; *Wodayu*, *waddan*, Tam.; *Garari*, Mar.; *Madara*, Cingh.

A small deciduous tree. Bark  $\frac{1}{4}$  inch thick, dark brown, almost black, often with a reddish tinge, rough with numerous cracks, exfoliating in rectangular woody scales. Wood red, tough, moderately hard to hard, close and even-grained, warps in seasoning. Heartwood dark red, small; sapwood lighter coloured. Pores small, arranged in radial lines between the very fine and very numerous equidistant medullary rays.

Bandelkhand, Satpura Range and forests southwards to the Godavari mountains of South India.

Weight, 54 to 55 lbs. per cubic foot. Beddome says the wood is much used in India. It coppices readily and in great abundance; it may, therefore, be specially recommended where fuel has to be produced in tropical parts of India, but it is also recommended as a useful wood for turning. The outer crust of the capsule is said to be poisonous.

C 1175.	Ahiri Reserve, Central Provinces	. . . . .	lbs.
			54
C 1252.	Gumsūr, Madras	. . . . .	55
C 1306.	" "	. . . . .	54

This wood resembles that of *Eugenia operculata* in outward appearance and in structure, but differs by the absence of concentric lines. It is almost identical with that of *Flacourtia Ramontchi*, and if it were not for the great difference in the bark which in *Lebedieropsis* is darkcoloured, almost black and deeply fissured, and in *Flacourtia* light coloured, smooth, with short narrow horizontal cracks, one might be inclined to suspect a mistake in the specimens. The only difference that can be seen under the glass is that the medullary rays in *Flacourtia* are slightly wavy, while those of *Lebedieropsis* are straight.

## 12. CROTON, Linn.

A large genus of trees and shrubs, erect or straggling, with about 19 Indian species. The following list has been extracted from Müller's Monograph in DeCandolle's Prodrromus, Vol. xv. 2, those newly added by Beddome and Kurz being given in brackets:—

## SECTION I. ELUTERIA.

<i>C. Joufra</i> , Roxb.	. . . . .	Eastern Bengal, Burma.
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## SECTION II. EUCHROTON.

<i>C. argyratus</i> , Bl.	. . . . .	Burma, Andamans.
<i>C. oblongifolius</i> , Roxb.	. . . . .	North and South India, Bengal, Burma.
<i>C. reticulatus</i> , Müll. Arg.	. . . . .	South India.
<i>C. lacciferus</i> , Linn.	. . . . .	Ditto.
<i>C. aromaticus</i> , Linn.	. . . . .	Ditto.
<i>C. chlorocalyx</i> , Müll. Arg.	. . . . .	Eastern Bengal.
<i>C. rhodostachyus</i> , Müll. Arg.	. . . . .	Burma.
<i>C. caudatus</i> , Müll. Arg.	. . . . .	Eastern Bengal, Burma, South India.
<i>C. Tiglium</i> , Linn.	. . . . .	Bengal, Burma, South India.
<i>C. birmanicus</i> , Müll. Arg.	. . . . .	Burma.
<i>C. lavifolius</i> , Bl.	. . . . .	Eastern Bengal.
<i>C. Wallichii</i> , Müll. Arg.	. . . . .	Burma.

( <i>C. scabiosus</i> Beddome)	.	South India
( <i>C. malabaricus</i> Beddome)		Ditto
( <i>C. robustus</i> Kurz)		Burma
( <i>C. sublyratus</i> Kurz)		Andamans
( <i>C. flocculosus</i> Kurz)		Burma
( <i>C. calococcus</i> Kurz)		Ditto

*C. Joufra* Roxb Fl Ind iii 685 Kurz ii 373 Vern *Joufra* Beng is a tree of Eastern Bengal and Burma *C. oblongifolius* Roxb Fl Ind ii 688 Beddome cciv Brandis 439 Kurz ii 373 Gamble 70 Vern *Arjunna* Oidh Ach Nep

able medicine

*C. scabiosus* Beddome t 283 and *C. malabaricus* Beddome cciv are trees of the Western Ghats with silvery leaves

1 *C. argyratus*, Bl , Kurz ii 372 Vern *Chonoo*, Burm , *Talib-da*, And

A moderate sized or small evergreen tree Bark thin grey Wood hard, yellow, close and even grained, seasons well Pores large and very large, scanty, circular, very prominent on a vertical section Medullary rays extremely fine, very numerous Numerous wavy concentric lines (of darker colour?)

Martaban Tenasserim and the Andaman Islands

Weight 46 to 48 lbs per cubic foot Wood worthy of notice

B 501 Andaman Islands

B 515

lbs

48

46

2 *C. caudatus*, Mull Arg Kurz ii 375, Gamble 70 *C. drupaceum*, Roxb Fl Ind iii 683 Vern *Nan bhantur*, Beng , *Takchabrik*, Lepcha

A large straggling shrub Bark thin, grey Wood white or yellowish white, hard, close grained Pores large scanty, sometimes subdivided, prominent on a vertical section Medullary rays very fine to extremely fine, very numerous Numerous wavy concentric lines of white tissue often interrupting the rays

Bengal Assam Burma and South India, chiefly on the banks of streams

Home says the wood is used for fuel and the leaves applied as poultices to sprains

E 3298 Siroke Darjeeling Terai

B 3201 Burma (1862) *Thitsynlat* supposed to be *Croton oblongifolius* has a white wood similar in structure to *C. argyratus* except that the fine wavy concentric bands are more prominent and the pores are smaller

### 13 TREWIA, Linn

1 *T. nudiflora*, Linn , Roxb Fl Ind iii 837, Beddome t 281, Brandis 443, Kurz ii 379, Gamble 70 Vern *Tumri*, *lhamara bhis*, *laura*, Hind , *Pitali*, Beng , *Garum, gamari*, Nep , *Tungflam*, Lepcha,



Fine, uniform, closely packed medullary rays, pores small, in radial lines, in some species numerous faint transverse bars

**1. *M. philippinensis***, Mull Arg, Beddome t 289, Brandis 414, Kurz n 381, Gamble 70 *Rolleria tinctoria*, Roxb Pl Ind n 827, Vern Kamela, kamal, kambal, kumila, Pb, Kuen, inna, roli, Kumau, Rohm, Oudh, Reoni, Banda, Rami, rovi, C P, Pinaag, tung, kishur, Beng, Sinduria, Nep, Puroa, tukla, Lepcha, Baraburi, sindurpong, Mechi, Chindrapang, machugan, Garo, Gangar puidum, Ass, Kumala, sundragundi, Urya, Kapli, karia, Tam, Kunkuma, vassuntlagunda, chendra, sindur, Tel, Koku, Gondi, Kuki, cornuga manye, sainakasari, kutchellu, Kan, Shendri, Mar, Ponnagan, Mal, Hamparandella, Cingb, *Tau theedri*, Burm

A small tree Bark  $\frac{1}{2}$  inch thick, grey, inner substance red, marked by irregular cracks Wood smooth, grey to light red, hard, close grained, no heartwood Annual rings indistinct Pores small, uniformly distributed, scanty, often subdivided Medullary rays uniform, very fine, very numerous, equidistant, the distance between them less than the diameter of the pores Faint indications of transverse bars

Sub Himalayan tract from the Indus eastward ascending to 4500 feet Bengal, Central and South India, Burma and the Andaman Islands

Weight 48 lbs per cubic foot Wood warps and shrinks used only for fuel The bark is used for tanning The crimson powder which covers the ripe fruit is used for dyeing silk and as a purgative and anthelmintic Dr Bidie states in his Paris Exhibition List of 1878 that he described the structure of the grains of Kamela in the *Madras Quarterly Journal of Medical Science* He says that they consist of a solid substance enclosed in a membranous sac, which is not acted on by water, though soluble in alcohol or an alkaline solution

P 109	Satley Valley, 3 000 feet
C 1178	Ahri Reserve Central Provinces
E 699	Bamunpokri Dargeling Terai
E 2421	"

lbs  
60  
43  
61  
49

**2. *M. albus***, Mull Arg, Beddome ccviii, Brandis 444, Gamble 70, *Altelracoccus*, Kurz n 382 *Rolleria alba* and *telaeocca*, Roxb Pl Ind n 829, 826 Vern *Marleya*, Sylhet, *Jogi mallata*, Nep, Numbong, Lepcha

A small evergreen tree with thin brownish grey bark Wood soft, white Pores moderate sized and large, often subdivided Medullary rays as in *M. philippinensis*.

Sil in Eastern Bengal Chittagong, Western Ghats Mysore and Ceylon Weight 31 lbs per cubic foot Leaves covered beneath with dense white tomentum

E 2192 Siroke, Dargeling Terai

lbs  
31

**3. *M. Roxburghianus***, Mull Arg, Kurz n 383, Gamble 70 *Rolleria peltata*, Roxb Pl Ind n 828 Vern *Kamli mallata*, *physaria mallata*, Nep, *Nem pooli*, Beng, *Singalium*, Sylhet

A small evergreen tree Wood white, moderately hard, close grained Pores small, often in radial lines, uniformly distributed Medullary rays uniform, fine, very numerous, equidistant Faint transverse bars

*Pilularia*, Mar.; *Kail Kunblla*, Kan.; *Hwupunkban*, Magh; *Thilimyoike*, ye-myo, Burm.  
A deciduous tree. Bark smooth, grey. Wood white, soft, not durable. Pores moderate-sized, subdivided and often elongated, the transverse diameter several times greater than the distance between the closely packed uniform, fine medullary rays.

Sub-Himalayan tract from the Jmna eastwards, ascending to 3,000 feet, Bengal, Burma, South India.  
Weight, 28 to 29 lbs. Used for native drums and agricultural implements. Recog- nised by its opposite leaves, which resemble those of *Gmelina arborea*.

E 2468. Calcutta  
B 311. Burma (1867)

lbs.  
29  
28

#### 14. MALTOTUS, Loureiro.

A genus of trees or shrubs with large, often pellate, leaves. Most of them are of no importance, and only a few are common. The following list is taken from the Prodromus, from Dr. Müller's Monograph, wherein 22 Indian species are described:—

##### SECTION I. BLUMBOEDENDRON.

*M. Tokbrui*, Müll. Arg. (*B. Tokbrui*, Kurz ii. 391) . Andamans.

##### SECTION II. ROTTERBOISIS.

*M. lappaceus*, Müll. Arg. . . . . Burma.

E 3397. The Park, Darjeeling, 6,500 feet.

#### 15. MACABARANGA, Pet. Thouars.

A genus of about 12 species of Indian trees or shrubs. They have large often pellate leaves, are fast growing, and chiefly found in old clearings, where they often come up gregariously. The following list gives Dr. Müller's species, those since described by Kurz being given in brackets:—

##### SECTION I. MAPPA.

*M. Tamaris*, Müll. Arg. . . . .  
*M. gummiflua*, Müll. Arg. . . . .  
*M. denticulata*, Müll. Arg. . . . .  
*M. Hefteri*, Müll. Arg. . . . .  
*M. populifolia*, Müll. Arg. . . . .  
Andamans. . . . .  
Sikkim, Eastern Bengal. . . . .  
Sikkim, Burma. . . . .  
Burma, Andamans. . . . .  
Andamans.

##### SECTION II. EUMACABARANGA.

*M. indica*, R. Wight . . . . .  
Sikkim, Khasia Hills, Western Ghats, Andamans.  
Tinnevely. . . . .  
Western Ghats. . . . .  
Eastern Ghats. . . . .  
Tenasserim. . . . .  
Andamans. . . . .  
Martaban Hills, 4,000 to 6,000 feet.

*M. flexuosa*, R. Wight . . . . .  
*M. tomentosa*, R. Wight . . . . .  
*M. pellata*, Müll. Arg. . . . .  
*M. minutiflora*, Müll. Arg. . . . .  
(*M. andamanica*, Kurz) . . . . .  
(*M. membranacea*, Kurz)

Five, uniform, closely packed medullary rays, pores small, in radial lines, in some species numerous faint transverse bars

1. *M. philippinensis*, Mull Arg, Beddome t 289, Blandis 444, Kurz n 381, Gamble 70. *Rolleria tinctoria*, Roxb Fl Ind n 827. Vern Kamela, kamal, kambal, kumila, Pb, Ruen, rinua, roli, Kumuan, Rohm, Oudh, Reoni, Banda, Rauni, tori, C P, Pnag, lung, kishur, Bedg, Sinduria, Nep, Puroa, tukla, Lepcha, Baraburi, sindurpong, Mechi, Chinderpang, machugan, Garo, Gangai paddum, Ass, Kumala, sundragundi Urya, Kapli, kavit, Tam, Kumkuma, vassunlagunda, chendra, sundur, Tel, Koku, Gondi, Kuteu, conunga manye, sarnakasari, kutchellu, Kan, Shendri, Mar, Ponnagan, Mal, Hamparakdella, Cingb, Tan theedri, Burm

A small tree bark  $\frac{1}{2}$  inch thick, grey, inner substance red, marked by irregular cracks. Wood smooth, grey to light red, close grained, no heartwood. Annual rings indistinct. Pores small, uniformly distributed, scanty, often subdivided. Medullary rays uniform, very fine, very numerous, equidistant, the distance between them less than the diameter of the pores. Rain indications of transverse bars

The  
d for  
Exhibi  
tion List of 1878 that he described the structure of the grains of Laminia in the  
dye ng s lk  
dark is used  
" *Adiantum* *reflexum* L. & *Adiantum* *reflexum* L. *Adiantum* *reflexum* L. *Adiantum* *reflexum* L.  
cubic foot  
meant

H 2425 Takdah Forest Darjeeling 5 000 feet  
 3. *M. gummiflua*, Mull Arg, Gamble 70 Vern *Jeg mullata*,  
 Nep, *Chairo*, Garo, *Burna*, Chittagong, *Pawang*, Megh Wood greyish  
 red, soft, in structure similar to that of *M. indica*

Sikim from 3 000 to 6 000 feet Eastern Bengal  
 Gt with fast on specimen shaved 3 rings per inch of radius Weight, 22 lbs per  
 cubic foot Wood used for similar purposes to that of *M. denticulata*  
 E 2426 Pungabong, Darjeeling, 6 000 feet  
 29 lbs

16 RICINUS, Linn

1. R. communis, Linn, Roxb Fl Ind iii 689, Bravais 445, Kurz ii 400, Gamble 71 The Castor Oil Plant or Palma Christi Vern Rand, arand, arendi, Ind, Hind, Ameru, Chenab, Haranuli, Salt Range, Ind rendi, Kumann, Ore, Nep, Kallip, Lepcha, Sittamunnuk, Lani, Amadum, amai siltamundi, Tel, Nerunda, Gondi, Haralu, Kan, Kyeisu, Burn

A large shrub or small tree Bark thin, light greyish brown Wood white, soft, light, with large central pith Pores moderate sized, scanty, uniformly distributed, often subdivided Medullary rays numerous, fine to moderately broad.

Indigenous in Arabia and North Africa, cultivated throughout India and often found run wild.  
Usually cultivated for the oil which is expressed from its seeds, and which is so largely used for burning, for lubricating machinery and in medicine.  
It is also grown for its leaves, which are used for feeding silkworms. The 'Eri' silk of Assam produced by *Attacus Ricini* fed on the leaves of the castor oil plant, gives a beautiful fine silk, used to make wearing apparel by the Assamese and Meechis.

E 3277. Naltanpara, Western Duars.

## 17. HOMONOYA, Loureiro.

Three species. *H. vetusa*, Müll. Arg.; Beddome cexii.; Brandis 445, is a small shrub of river banks in South India.

1. *H. symphyllifolia*, Kurz; Gamble 71. Vern. *Bayadanti*, Nep.; *Ching*, Lepcha.

A moderate-sized evergreen tree. Bark very thin, white or light grey, peels off in thin flakes. Wood yellowish white, hard, smooth, close-grained. Annual rings indistinct. Pores very small, numerous, uniformly distributed, sometimes in radial lines. Medullary rays very fine, very numerous. Few concentric lines (?).

Damp forests of the lower Daryeling Hills.

Weight, 54 to 59 lbs. per cubic foot. The section of the stem is very irregular, presenting deep sinuosities. The wood is hard and tough, and is used for punting poles by the Tista boatmen. It is recommended for trial as a substitute for boxwood.

E 496. Khoolloom Forest, Daryeling . . . . .  
E 2429. Tista Valley, near Sivoke, Daryeling . . . . .  
lbs. 54 : 59

2. *H. riparia*, Lour.; Beddome cexii.; Brandis 445; Kurz ii. 401; Gamble 71. *Adelia nervifolia*, Roxb. Fl. Ind. iii. 849. Vern. *Kan-*

*dggar*, Kumann; *Kholu wis*, Nep.; *Alonghel*, Lepcha; *Tunki*, Tel.; *Sundeh*, Gondi; *Jelyambu*, Kurku; *Kat-alluri*, Mal.; *Monakha*, *yay-ta-gyeeben*, Burm.

A small shrub. Bark brown. Wood grey or greyish brown, moderately hard, close-grained. Pores scanty, moderately large, often sub-divided. Medullary rays of two classes: few moderately broad and short, and numerous long, fine rays, which, as a thin section, appear as a succession of small black cells.

Rocky and stony river beds throughout India.  
Weight, 40 lbs. per cubic foot.

E 3303. Sivoke, Daryeling Terai . . . . .

lbs. 40

## 18. JATROPHA, Linn.

About 4 species: *J. Wightiana*, Müll. Arg., is a small shrub of South India. *J. nana*, Dalz., is an undershrub of stony places in the Dekkan. *J. glandulifera*, Roxb. Fl. Ind. iii. 688; Kurz ii. 403 (*Adalaya*, Tam.; *Nela-amida*, Tel.) is a shrub common near villages in Bengal and Burma. The seeds give an oil which is used in medicine. *J. multifida*, Linn., the Coral Plant, is much grown in gardens for its handsome scarlet flowers and deeply-cut leaves.

**L. J. Curcas**, Linn, Roxb Fl Ind in 686, Brandis 442, Kurz n. 403, Gamble 71 The Physic Nut Vern *Bagherenda, sayed ind*, Hind, Beng, Kadam, Nep, *Kaat amunak*, Tam, *Nepalam*, Tel, *Mara-narulle, maraharatu*, Kan, *Kaak avenako*, Mal, *Thindan-kyelan*, Burm. A soft, wooded evergreen shrub Bark greenish white, smooth, peel- ing off in thin flakes Wood white, very soft Pores small, scanty; often subdivided Medullary rays extremely fine, very numerous

Indigenous in America cultivated in most parts of India Weight 25 lbs per cubic foot Often used for hedges and planted near villages The juice of the leaves forms a lather like soap The seeds give an oil which is used for burning in medicine as a purgative and emetic, and as an application in cutaneous diseases

E 2427 Manyha, Darjeeling Terai

lbs  
25

## 19 GIVOTIA, Gnt

**I G rotteriformis**, Gnt, Beddome t 285, Brandis 442 Vern, *Tendale, butali, bulali*, Tam, *Tella punki*, Tel

A middle sized tree Wood white, exceedingly light, very soft but even grained Pores moderate sized, scanty, very prominent on a vertical section, often in concentric lines, annual rings marked by a line of larger, more numerous pores Medullary rays uniform, fine, short, the distance between the rays greater than the transverse diameter of the pores

Dekkan Mysore Eastern Ghats and Ceylon Growth very fast, our specimen shows 1½ rings per inch but the annual rings are somewhat doubtful Weight 14 lbs per cubic foot The wood is used to carve figures for toys imitation fruit and other fancy articles which are lacquered and painted also for catamarans The seed give an oil which is valuable for lubricat- ing fine machinery

D 3162 Cuddapah, Madras

lbs  
14

## 20 OSTODES, BI

Three species  
*Wakkakona*,  
*Neisser* Mull Arg  
Moulmein

**I. O paniculata**, BI, Kurz n 404, Gamble 72 Vern *Bepari*,

Nep, *Paloy*, Lepcha A large evergreen tree Bark light grey Wood white, soft Pores scanty, small to large, subdivided Medullary rays very fine, uniform, closely packed

Forests of Sikkim from 2000 to 6000 feet, Khasia Hills and the Hills of Martaban Growth moderate 8 to 9 rings per inch of radius Weight 26 lbs per cubic foot It gives a gum which is used as size in the manufacture of paper

E 3110 Darjeeling 6,000 feet

lbs  
26

21. CHÆTOCARPUS, Thw.

1. *C. castaneescarpus*, Thw. Enum. 275; Beddome t. 284; Kurz ii. 409. Vern. *Billockra*, Beng.; *Haddoka*, Cingh. A moderate-sized tree. Wood light red, moderately hard, close-grained. Pores small, numerous. Medullary rays very fine, very numerous, traversed by narrow wavy concentric bands. Khasia Hills, Eastern Bengal, Burma, Andaman Islands and Ceylon. Weight, 58 lbs. per cubic foot. Wood used in Ceylon for building.

No. 34. Ceylon Collection (*C. pungens*) . . . . . lb. 58

22. EXCÆCARIA, Linn.

The following list of species is taken from the 'Prodromus' of DeCandolle:—

SECTION I. TRIADICA.

*E. sebifera*, Müll. Arg. . . . . Cultivated, Northern  
*E. baccata*, Müll. Arg. . . . . India, Eastern Bengal, Burma.

SECTION II. FALCONERIA.

*E. insignis*, Müll. Arg. . . . . North India, South India, Burma.

SECTION III. SCYTHROCHOTON.

*E. cochinchinensis*, Lour. . . . . South India.  
*E. virgata*, Miq. . . . . Martaban.  
*E. indica*, Müll. Arg. . . . . Sundarbans, Tenasserim.

SECTION IV. EUPHOCÆARIA.

*E. oppositifolia*, Jack. . . . . Malabar, Mysore, Tenasserim.  
*E. Agallocha*, Willd. . . . . Bengal, South India, Burma, Andamans.  
*E. acerifolia*, F. Didiéhs . . . . . Kumann, Nepal, Khasia Hills.  
*(E. holophylla, Kurz)* . . . . . Martaban and Tenasserim.  
*E. acerifolia*, F. Didiéhs; Brandis 441. Vern. *Pitkid*, Kumann, is a large milky shrub, whose root is used as a cathartic.

Wood soft, spongy. Pores moderate-sized to large. Medullary rays very fine, uniform, closely packed. Faint concentric lines. 1. *E. sebifera*, Müll. Arg.; Brandis, 441; Gamble ii. *Carumbium sebiferum*, Kurz ii. 412. *Sapium sebiferum*, Roxb. Fl. Ind. iii. 693. The Chinese Tallow-tree. Vern. *Mon-china*, Beng. A moderate-sized tree. Bark grey, with shallow, vertical cracks. Wood white, moderately hard. Pores small to large, often subdivided. Medullary rays very fine, very numerous, the distance between the rays less than the transverse diameter of the pores; the rays are traversed by numerous fine, wavy, concentric lines.

Indigenous and cultivated in China and Japan Introduced and cultivated throughout Northern India  
 Growth rather fast 6 rings per inch of radius (our specimen) Weight 32 lbs per cubic foot The white pulp round the seeds gives the Chinese tallow which is separated by boiling in water It is used in China and Japan for candles Roxburgh says it is bad for burning that it only remains firm at a cool temperature and that it easily becomes rancid It melts at 104° The seeds give an oil and the leaves a black dye It is a handsome tree, somewhat like *Gissu* in foliage, and often planted for ornament

2 *E. baccata*, Mull Arg, Brandis 441, Gamble 72 *Canarium baccatum*, Kurz ii 412 *Sapium baccatum*, Roxb Fl Ind iii 694 Vern *Pudlikat*, lat *karnyal*, Nep, *Adamsali*, Ass, *Billa*, Sylhet, *Linhun* Burm

To this species probably belongs II 1962 from Chittagong, a soft grey wood, in structure resembling that of *E. indica*, as well as II 3340 from Assam, called there *Larsing*, Nep, *Selling*, Chota Nagpur coolies, *Larsna*, Assamese

A large evergreen tree of Northern and Eastern Bengal Chittagong and Burma Weight 28 lbs per cubic foot The bark is chewed by natives in Assam

3 *E. insignis*, Mull Arg, Brandis 442 *C. tum- binum insignis*, Kurz ii 412 *Falconeria insignis*, Koyie Vern *Judla*, *bidar*, *biloga*, *kavalla*, *ledra*, Pb, *Khinna*, *khina henda*, *tendwa*, Hind, *Garpa shola*, Anamalais  
 A small deciduous tree Bark grey, smooth, shining, with large, broad, longitudinal wrinkles Wood grey, very soft, spongy Annual rings finely marked Pores moderate sized and large, subdivided, and often in short radial lines Medullary rays very fine, indistinct

Sub Himalayan tract from the Beas eastwards ascending to 4000 feet Chittagong Burma and Western Ghats as far north as Nasik

Weight 23 to 29 lbs per cubic foot The whole tree is full of an

4 *E. indica*, Mull Arg, Beddome cccv, Brandis 441, Kurz ii 413 *Sapium indicum*, Roxb Fl Ind iii 692 Vern *Hurna*, *batal*, Beng, *Kuri makalu*, Cough  
 A small evergreen tree, with smooth, grey bark Wood soft, white, with small brown heartwood Pores moderate sized and large, oval, often subdivided Medullary rays equally distributed, very fine, closely packed The transverse diameter of the pores is greater than the distance between the rays

Sundarbans and tidal forests of Tenasserim and Ceylon Weight 29 lbs per cubic foot The wood is used in the Sundarbans for fuel The juice of the tree is very poisonous and the seeds are used to poison fish

5. *E. Agallocha*, Willd.; Roxb. Fl. Ind. iii. 686; Beddome cexv.; Brandis 442; Kurz ii. 414. Vern. *Gangwa*, *geor*, *ngurw*, *gerwa*, Beng.; *Nayan*, *kayan*, Burm.; *Yekim*, Burm. in the Andamans. A small evergreen tree which exudes poisonous milk. Wood very soft, spongy. Pores small, scanty, sometimes in radial lines. Medullary rays very numerous, extremely fine.

Coast and tidal forests of India, Burma and the Andaman Islands. Weight, 26 lbs. per cubic foot. Home in his Sundarbans List of 1874 says: "Grows occasionally to 5 feet in girth and 40 feet in height, though generally cut for posts when of small girth. It is a useful wood for general carpentering purposes, such as toys, bedsteads, tables, &c., a white timber; the juice which exudes from the bark when green is very poisonous." Roxburgh says it is only used for charcoal and firewood.

E 396. Sundarbans . . . : : : : :  
B 2477. Andaman Islands (Kurz, 1866) . . . : : : : :  
lbs. 24 . . . : : : : :  
28 . . . : : : : :

### 23. EUPHORBIA, Linn.

About 11 species of Indian small trees or shrubs usually with thick, fleshy, angular branches and short gouty stems, *E. sessiliflora*, Roxb. Fl. Ind. ii. 471; Kurz ii. 415, is a fleshy undershrub of Pegu. *E. nervifolia*, Linn.; Beddome cexvi.; Brandis 439; Kurz ii. 416; Gamble 72 (*E. ligularia*, Roxb. Fl. Ind. ii. 465). Vern. *Mansa sy*, Beng.; *Ganglich*, Pb.; *Thor*, Bombay; *Shasouny*, Burm., is a small tree with cylindric stem and 5-angled, spirally twisted stem, cultivated near villages in most parts of India. It is considered a sacred tree by the Meebis of the Sikkim Terai and Bhutan Džars, and is consequently often found on deserted village sites. The milk is used in native medicine and the root to cure snake-bite. *E. Nivulia*, Ham.; Beddome cexvi.; Brandis 439; Kurz ii. 417 (*E. nervifolia*, Roxb. Fl. Ind. ii. 467) Vern. *Sy*, Beng.; *Nerwang*, Mar.; *Sha-souny*, Burm., is a shrub of dry and rocky sites in Garhwal, Sind, the Dekkan and Burma, with round branches. *E. antiquorum*, Linn.; Roxb. Fl. Ind. ii. 468; Beddome cexvi.; Brandis 438; Kurz ii. 416. Vern. *Nava sy*, *tekaia sy*, Beng.; *Tidhara*, Hind.; *Shidu*, Mechi; *Shasouny-pya-thal*, Burm.; *Daluk*, Cingh., is a shrub with 3-angled branches, common on dry hills in Bengal and the Peninsula. *E. trigona*, Roxb. Fl. Ind. ii. 468; Beddome cexvi.; Brandis 438, is a small tree with 3-angled stems found on arid hills in Coimbatore. *E. tortilis*, Rottler; Beddome cexvi.; Brandis 439, is a small tree of dry hills in South India, with 3-angled, spirally twisted branches. *E. Cattimandoo*, Elliott; Beddome cexvi.; Brandis 438. Vern. *Katti mandu*, Tel., is a small tree with 5-angled branches common in Vizagapatam district, and yielding a copious milk, which is used as a cement. *E. Trivacalli*, Linn.; Roxb. Fl. Ind. ii. 470; Beddome cexvi.; Brandis 439; Kurz ii. 417. Vern. *Tanka sy*, Beng.; *Sehad*, Hind.; *Tru kall*, Mal.; *Sha-souny-telengo*, Burm., is a small tree with round stems and smooth green branches, cultivated throughout India and used as hedges. The wood is strong and used for veneering and toys; the milk is very acid. Skinner, No. 69, gives the weight 36 lbs., P = 618. He says that twigs thrown into a tank when the water is low intoxicate and kill the fish. *E. ephyphylloides*, Kurz ii. 416, is a small tree of the Andamans. The well-known *E. pulcherrima*, Willd. or *Poinsettia pulcherrima* is a garden shrub with large crimson floral leaves, introduced from Mexico, and cultivated in gardens in most parts of India.

1. *E. Royleana*, Boissier; Brandis 438. *E. pentagona*, Royle. Vern. *Thor*, Punjab; *Sali*, Jhelam; *Chula*, Chenab; *Chun*, Ravi; *Chu*, *chunga*, *surs*, Beas; *Saro*, *tsu*, Sutlej; *Sohund*, Kumaun. A large, milky shrub. Wood spongy. Pores small, subdivided, scanty. Medullary rays extremely fine.

North-Western Himalaya, ascending to 6,000 feet. It reaches 15-16 feet in height, the stems having 2-3, and often even 5-6 feet in girth.



It is often planted as a hedge and grows readily from cuttings, even on the driest soil

P 3075. Sabathu, Punjab

24. *BUXUS*, Tournefort.

1. *B. sempervirens*, Linn, Brandis 447, *B. Wallichiana*, Baillon, *Vein. Shanda laghane*, Afg, *Chikri*, Kashmir, *Papri*, *papar*, *paprang*, *shamsbad*, *shumay*, Pb  
 An evergreen shrub or small tree. Bark grey, soft, corky, cut into small plates by deep irregular cracks. Wood yellowish white, hard, smooth, very close and even-grained. Annual rings distinctly marked by a narrow line without pores. Pores extremely small, very numerous, uniform and uniformly distributed. Medullary rays fine to extremely fine, very numerous.

localities of boxwood in the North-West I — chief —

*In the Punjab —*

Rawal Pindi Division

Occasional in ravines of the Margulla Synd-pore Range, but of small size, the largest being 6 inches and the average 4 inches in girth  
 Scattered trees in the Talagang and Khusha Forests

Beas Division

Ruel Reserve, North

4 A locality in Seeraj, Kulu  
 5 A locality in Balhan Koh

Sutlej Division

Trees and groups of trees between Wangtu and Kaliba.  
 A small forest to the north of the Shali Range

*In the North-West Provinces —* About 3,400 trees were counted in the forests

It is estimated that the cost per cubic foot of boxwood delivered at Saharanpur from the Kalso forest would be Rs 18, its further cost by rail from Saharanpur to Bombay would be at least Rs 18 or total Rs 36 per cubic foot. Considering 1 cubic foot as weighing 60 lbs, we have the cost per ton as Rs 112, which could only be just foot as weighing 60 lbs, we have the cost per ton as Rs 112, which could only be just foot as weighing 60 lbs, we have the cost per ton as Rs 112, which could only be just



"Boxwood is the nearest approach to ivory of any wood known, and will therefore probably gradually increase in value as it, as well as ivory, becomes scarcer. It is now used very considerably in manufacturing concerns, but on account of its gradual advance in price during the past few years, cheaper woods are in some instances being substituted.

"Small wood under 4 inches is used principally by flax spinners for rollers and by turners for various purposes, rollers for rink skates, &c. &c. and it free from splinters is of equal value with the larger wood. It is imported here as small as 1½ inches in diameter, but the most useful sizes are from 2½ to 3½ inches and would therefore, we suppose, be from 15 to 30 or 40 years in growing, whilst larger wood would require 50 years and upwards at least, perhaps we ought to say 100 years and upwards. It is used principally for shuttles for weaving silk, linen and cotton, and also for rule

H 930	Hazara, 7,000 feet	lbs
H 166	Kangra (Stewart 1866)	68
H 168	Shahpur "	69
H 614	Kulu 7,000 feet	68
H 951	Kannawar	61
H 990		60
H 38	Kandru, Simla, 8 000 feet	57
H 77	Shah, Simla, 7 000 feet	55
H 2914	Darya bloc, Deoban, North Western Provinces	53
H 424	Darya bloc, Deoban, North Western Provinces	53

## 25 SARCOCOCCA, Lindl.

Two species, *S. saligna*, Mull Arg, with its derived and *S. Hookeriana*, Bail, with perennated leaves. The latter is a shrub of the hills of Sikkim

1. *S. saligna*, Mull Arg, Beddome cexvi, Brindis 418, Gamble 72 Vern *Sukat sing*, Kumaun, *Chitika*, Nep  
A small evergreen shrub Wood white, moderately hard Pores very small and extremely small Medullary rays fine and moderately broad

Afghanistan Himalaya at 4 000 to 7,000 feet, ascending in Sikkim to 9 000 feet, Khasia Hills, Nilgiris and Western Coast  
Wood sometimes used for walking sticks  
H 2832 Simla 7 000 feet

Two genera, *Betula* and *Alnus*. Himalayan trees, with similar qualities to the Birches and Alders of Europe.

Three Indian species. The common European Birch is *B. alba*, Linn., and the American Paper Birch, of which the light, portable canoes are made in Canada, is *B. papyracea*, Willd.

1. B. Bhogpattra, Wall.; Brandis 457; Gamble 79. B. Jucque-  
montii, Spach. Vern. Būy, burzal, bhūy, phur, Ph.; Shāk, pād, phalak,  
lakpa, Ladak, Lahoul, Piti, Kanawar; Takpa, Bhutia; Bhūyapattra, Hind.;

oblong lenticles, the outer bark consisting of numerous distinct, thin, papery layers, peeling off in broad horizontal rolls. Wood white with a pinkish tinge, tough, even-grained, moderately hard. Pores small, not numerous, uniform and uniformly distributed except that sometimes they are arranged in interrupted lines along the edges of the annual rings. Medullary rays fine and very fine, numerous, prominent on a radial section.

and ascending to 14,000 feet. Growth slow, the countings taken from our specimens were very uniform, 5 specimens varying only from 13 to 18 rings, giving an average of 15 rings per inch of radius. Aikin, in Wallich's List, gives 8.4 rings per inch. In weight, also, the experiments of Dr. Warth on six specimens gave only a variation from 42 to 46 lbs. with an average of 44 lbs.; Wallich gave 35.5 lbs. per cubic foot.

The wood is extensively used in the inner and Himalaya for building; it is elastic, seasons well and does not warp. The bark is very valuable; it is used as paper for writing and packing, for umbrellas, book-tubes, and for roofing houses. The branches are made into twig bridges, and the leaves are lopped for cattle-fodder.

[illegible]

Vern. Puya udish, hambar majya, maksheri, sheori, shag, Pb.; Bhuj-patra, haur, shail, Hind.; Haoul, Kumau; Shareshin, Tibet; Saver, sauer, payong, utis, Nep.; Hlosungli, Lepcha; Dingteen, Khasia.

A large tree. Bark grey, peeling off in horizontal rolls. Wood white, moderately hard, close-grained. Pores small and very small, often subdivided; numerous in the inner part of each annual ring, scanty and smaller in the outer half. Medullary rays fine.

ound in  
lb c foot  
for all

H 611 Parbati Valley K in 8 000 feet  
H 2914 Nagkanda S in 8 000 feet  
E 2405 Darjeeling 7 000 feet

3 B cylindrostachys, Wall Gamble 80 Under B acuminata,  
Wall in Brands for Lora 458, Kurz n 176 Vern Shaoul, Kumann,  
Sauer, Nep, Su gti Lepcha

A tall deciduo is tree Bark pink, peeling off in large vertical flaes,  
giving the stem a shaggy appearance Wood red hard heavy Annual  
rings indistinct Pores scanty, small, often subdivided uniformly dis-  
tributed Medullary rays fine, numerous the distance between the rays  
larger than the transverse diameter of the pores

The wood  
for which  
branches

E 678 Bamunpokri Darjeeling Terai

lbs  
62

## 2 ALNUS, Tournefort

Two species The chief European Alders are *A glaberrima* Lam with glabrous  
leaves and *A incana* Willd with pubescent leaves

Pores small, uniformly distributed often in radial lines Medullary  
rays of two classes the broad rays composed of numerous fine rays  
Medullary patches scanty (common in some of the European species)

1 A mitida, Kndi, Brands 460 Vern Gtra, Afg, Shrol, saroli,  
*sawali, rikunra, chaub chapu, piak, kuma, ku idash, nu, kosh, rajan, Pb,*  
*Paya udesah, Kumann*

A large tree Bark brown rough with deep furrows Wood reddish  
white, soft close and even grained, tough to cut, annual rings distinctly  
marked by harder wood near the inner edge of each ring Pores small,  
numerous, uniformly distributed, arranged in radial lines Medullary  
rays of two classes, a few broad rays at considerable intervals with  
numerous fine rays between them, the broad rays, which consists of a  
large number of small, closely packed rays, are marked as irregular  
shining plates on a radial section Medullary patches scanty

28 to 31 lbs per  
rope bridges  
for drying and

cut  
tanu ng

H 119 Vazi, Kupa 6 000 feet  
H 147 Sami Suma 1 000 feet

lbs  
28  
31

2 A nepalensis, D Don, Brands 160, Kurz n 176, Gamble 80  
Vern Aohi, Pb Udesah, Kumann *Ulis, Nep, Aonai, Lepcha*  
A large deciduous tree Bark thick, outside silvery grey, resembling

H	83.	The Glen, Simla, 6,000 feet	.	.	.	.	.	.	..
E	836.	Tukdab Forest, Darjeeling, 5,000 feet	.	.	.	.	.	.	..
E	2106.	"	"	"	"	"	"	"	..

Two genera, *Salix* and *Populus*. With one or two exceptions, all Himalayan trees.

Wood soft, even-grained. Pores small, numerous. Medullary rays fine.

About 33 species, with very few exceptions confined to the Himalaya. They are mostly small, often prostrate shrubs, but in the arid regions of the inner Himalaya are of great use for firewood, birdges, basket-work and other purposes, and are often planted, as their quick growth and ready reproduction, either by cuttings or in coppice, ensures a constant supply of wood. The following list of the Indian species has been extracted from N. J. Anderson's Monograph in vol. xvi, p. 2, of DeCandolle's Prodromus.

The European species of willow, which are very numerous, belong to two sections, the "Sallows," the type of which is *S. Caprea*, and the "Osters," the type of which is *S. alba*. They are largely cultivated, and are in great use for all purposes, and especially for the protection of river banks and for basket-work.

(Stammes 3 er more, free.)

S. tetrasperma, Roxb.	.	.	.	.	.	.	.	.	.
S. pyrina, Wall.	.	.	.	.	.	.	.	.	.
S. catesactya, And.	.	.	.	.	.	.	.	.	.
S. urophylla, Lindl.	.	.	.	.	.	.	.	.	.
S. populifolia, And.	.	.	.	.	.	.	.	.	.
S. acmophylla, Boiss.	(Brandis 463.	Vern. Bed,	Afghanistan, Sind, Punjab.	.	.	.	.	.	.
Afig.; Bada, bisu, Pb.)	.	.	.	.	.	.	.	.	.
S. fragilis, Linn.	.	.	Tahoul, Tadak.	.	.	.	.	.	.
S. alba, Linn.	.	.	Tadak, Kashmir.	.	.	.	.	.	.
S. babylonica, Linn.	.	.	Sultman Range, elsewhere cultivated.	.	.	.	.	.	.

## SECTION II. DIXON.

(Stamens 2, free.)

*S. Caprea*, Linn. (Brandis 467. Vern. *Bedmushk*,

Pb. The leaves are used for sherbet)

*S. sclerophylla*, And.

S. Tallichiana, And.

Ladak, Drs.

Himalaya.

Northern India, cultivated,



A moderate-sized deciduous tree. Bark rough, with deep vertical, rough, shining fissures. Heartwood red, soft, porous, even-grained. Annual rings indistinctly marked by concentric lines. Pores small, very numerous, uniformly distributed, sometimes subdivided. Medullary rays fine, numerous, not distinct.

Throughout India, on river banks and in moist places, and in the Himalayan valleys ascending to 6,000 feet. In Minniken's report on the Delhi Bela Plantation the following measurements are given:—

[illegible]

or  $\frac{1}{2}$  to  $\frac{2}{3}$  rings per inch of radins; our specimens show 2 to 6 rings per inch of radins. Weight, Burmah List of 1862, No. 89, gave 37 lbs.; our specimens give 31 to 35 lbs. The wood is rarely used; it has been used for gunpowder charcoal; Llan says that in Assam it is used for posts and planks. The twigs are made into baskets and the leaves lopped for cattle fodder. The bark is said by Kaurz to be used for tanning, and by Dalzell to be used as a febrifuge.

II	155.	Sainj, Giri Valley	.	.	.
H	99.	Bhayji, Sutlej Valley	.	.	.
O	1485.	Kheri, Oudh	.	.	.
O	1465.	Gonda, Oudh	.	.	.
C	2818.	Melghat, Berar	.	.	.
E	1256.	Tezpur, Assam	.	.	.
Ibs.	35.		.	.	.
	35.		.	.	.
	32.		.	.	.
	32.		.	.	.
	35.		.	.	.
	31.		.	.	.
	35.		.	.	.

2. *S. fragilis*, Linn.; Brandis 466. Vern. *Tilichang*, Lahoul. A tree with grey, deeply fissured bark. Wood with reddish heart-wood. Annual rings marked by concentric lines.

H 141, from Taboul, is probably this species. It is cultivated in Lahoul and Tadak. Growth moderate, 11 rings per inch of radius, but the growth is fast while young, and gradually gets slower as the tree ages. Our specimen was 50 years old, and had a girth of 30 inches. Weight, 28 lbs. per cubic foot.

3. *S. babylonica*, Linn.; Roxb. Fl. Ind. in. 754; Brandis 465; Gamble 81. The Weeping Willow. Vern. *Bisa, bada, bed, kativa, majnu*, Pb.; *Gilr*, Kashmir; *Tissi, bhosi*, Nep.

A tree with pendent branches. Bark grey,  $\frac{1}{4}$  to  $\frac{1}{2}$  inch thick. Wood white, annual rings marked by a belt of more numerous pores in the spring wood. Commonly cultivated in North India. Said by Stewart to be indigenous in the

Sumner Range.  
Growth fast, our small specimen shows 5 rings per inch of radius; Stewart records 4 to 5 rings per inch of radius, and a girth of 4 feet as the average of 6 trees, 10 years planted out. The branches are made into baskets, and are used for weirs and the protection of canal banks. It is very commonly grown for ornament, and is readily reproduced by cuttings.

H 3060. Koti, Simla, 7,000 feet.

4. *S. Wallichiana*, And.; Brandis 468. Vern. *Bwir*, Pb.; *Bhans*, *thangli*, *kutgli*, North-Western Provinces. A large shrub with greenish grey bark. Wood white or pinkish



Afghanistan Kashmir Himalaya eastwards to Bhutan ascending to 9 000 feet Growth fast 6 rings per inch of radius Weight 32 lbs per cubic foot The branches are made into baskets

H 2910 Nagkanda Simla 8 000 feet  
H 3030

5 S elegans, Wall, Brandis 466 Vern *Bail, blai, dhans, Simla* A small shrub with pinkish wood Annual rings marked by a porous spring wood and by an autumn wood of firmer texture

North West Himalaya from 7 000 to 10 000 feet as far east as Nepal Lahoul Weight 33 lbs per cubic foot Used for his and *S. daphnoides* are often attacked by a brilliant orange coloured fungus which is *Leckythea salicina* Lev

H 2842 Mahasu S mli 8 000 feet  
H 2906 Nagkanda Simla 9 000 feet

6 S daphnoides, Vill, Brandis 469 Vern *Bed, bidar, betsa, deli, bushan, bashal, bhail, bhul, vudanu, shun, thail, Pb, Kur, Kashmir, Chanyama, chamma, malchany, katchany, West Tibet, Richang, roangching, chanykar, Lahoul* A shrub or tree with smooth bark Heartwood red shining Annual rings marked by more numerous pores in the spring wood

North West Himalaya both on the outer ranges and in the inner arid tract It extends to the Alps and the mountains of Central Europe

Growth variable the gave from 10 to 16 rings

Alathieu El For p 397 For building piles and tool pits Zaskar and Ladak and much grown in Lahoul from cut third or fourth year and the bran

lbs

H 284 Mahasu S mli 7 000 feet  
H 47 Kalasbi Simla 7 000  
H 66 Nagkanda Simla 8 000 feet  
H 2906 9 000  
H 3034 8 000  
H 3036 8 000  
H 142 Lahoul about 9 000 feet

34  
37  
33  
34

7 S viminalis, Lam, Brandis 470 Vern *Bitsu, Pb, Aumant* A shrub with shining, grey, slightly cracked bark, and white wood with the structure of the genus

Inner arid Himalaya from the Jhelam to Sikkim (*S. Smithiana* Willd) from 5 000 to 9 000 feet, cultivated in Lahoul Deras and Kanda var Common throughout Europe in oster beds

H 143 Lahoul about 9 000 feet

8 S sp (It may be near *viminalis*)

A deciduous shrub with smooth dark coloured bark and lanceolate leaves, covered beneath with white tomentum Wood soft, close grained, heartwood red Annual rings distinctly marked by an irregular belt of

numerous pores in the spring wood. Pores small and numerous in the spring wood, very small and scanty in the autumn wood. Medullary rays very fine, very numerous, uniform and equidistant.

Growth moderately slow, 13 rings per inch of radius.  
Weight, 31 lbs. per cubic foot.

E 966. Chumbi Valley, Tibet, about 8,000 feet . . . . . 31  
lbs.

## 2. POPULUS, Tournef.

Five species. *P. nigra*, Linn.; Brandis 472. The Black or Lombardy Poplar. Vern. *Sufeda*, Pb.; *Frost*, Kasbmir; *Frost*, *fursk*, *makkul*, Chenuh; *Kranul*, *bitus*, *do*, Sulej; *Xarpa*, *gillal*, *kabul*, Ladak, is a large tree commonly planted in Afghanistan, Kasbmir, the plains and hills of the Punjab, up to 12,500 feet in Ladak. Both varieties are fast growers, the Black Poplar attaining 80 feet in height with a diameter of 2 feet in 50 years. Both grow well from cuttings, and the leaves are lopped for cattle fodder. Mathieu, Fl. For. p. 428, gives the weight as 25 to 36 lbs. per cubic foot. *P. alba*, Linn.; Brandis 473. The Abele or White Poplar. Vern. *Sperdor*, *speda*, Afg.; *Chitta bagun*, *safdar*, *jungli frost*, *frost*, *prist*, *rikkan*, *sannu*, *channu*, *mid*, Pb., is a large tree, wild and cultivated in the North-West Himalaya up to 10,000 feet, and extending to Afghanistan, Beluchistan and on into Europe. It is generally raised from cuttings, and the growth is very fast, reaching a diameter of 2 to 3 feet in 50 years. The wood of this and of *P. nigra* is used for the Afghan grape-boxes. Mathieu, Fl. For. p. 422, gives the weight as 28 to 44 lbs. per cubic foot. *P. tremula*, Linn.; Brandis 474, is the Aspen Poplar of Europe.

Wood soft, even-grained. Pores small, numerous, often subdivided, uniformly distributed, except that they are scanty and generally somewhat smaller in the autumn wood. Medullary rays very fine, uniform. Medullary patches scanty.

1. *P. euphratica*, Olivier; Brandis 474. Vern. *Bahan*, Sind, Pb.; *Palki*, Brahui; *Hodung*, Ladak.

A large deciduous tree. Bark thick, with irregular, vertical furrows. Sapwood white, heartwood red, often nearly black near the centre, moderately hard, compact, even-grained. Annual rings marked by a very narrow belt with fewer pores. Pores small, very numerous, uniformly distributed, often subdivided. Medullary rays very fine, uniform, equidistant, the distance between the rays equal to the transverse diameter of the pores.

Banks of the Indus in Sind, the Upper Valley of the Indus, and its tributaries in Tibet.

Growth rapid: Brandis says 3 to 4 rings per inch of radius; our specimens are evidently fast grown, but the rings very difficult to distinguish, they seem to show about 4 to 6 per inch. Weight, our specimens show 32 to 37 lbs. per cubic foot, some experiments made at Kandahar by Captain Gall, R.E., with bars 1 ft. × 1 in. × 1 in. gave the weight 27.2 lbs. and 427 for the value of *P* (Indian Foot-Tester, Vol. v. p. 480.) The wood is largely used in Sind for building, turnery, louvered boxes, but not for fuel for the river steamers, as its heating powers are not great. On the Euphrates and Tigris it is used for planking and boat-building, and in the Punjab for the lining of walls. The inner bark is made into gun-match in Sind, and the bark given as a vermifuge. The leaves are used for fodder for goats and cattle. In Ladak it is much prized for fuel. It coppices well and bears pollarding long; coppice shoots are often used as rafters in Sind.

2 *P. ciliata*, Wall, Brandis 475; Gamble 81. Vern. *Safela*, *bagnu*, *phalya*, *phlassu*, *futs*, *paluch*, *phals*, *ban phrastu*, *rud phras*, *asan*, *sudi*, *rtkan*, *saki*, *gabe*, *chanu*, *krammal*, *kambal*, *pahari pipal*, Pb, *Chelann*, *cheln*, *Simla*, *Garpipal*, *Kummun*, *Bangikal*, *Nep*, *Sungtriong*, *Lepech*. A large deciduous tree. Bark smooth when young, with deep, vertical fissures when old. Wood grey or brownish grey, shining, soft. Annual rings marked by a belt of firm wood with scanty pores near the outer edge of each ring. Pores small, numerous, often subdivided, and arranged in short, radial lines. Medullary rays uniform, very fine, very numerous.

7 in — on an average, 29.5 lbs per cubic foot. Leaves as fodder for goats. The leaves are turns them white, and gives to a group of trees a curious appearance. This fungus is *Krypthe Martin*, Lev.

H 3138 Pungagali, Hazara H 31 Malyana, Simla, 7 000 feet H 2884 Nagkanda, " 8 000 " H 270 Khatop, Dalhousie, 7 000 feet E 970 Chumbi Valley, Tibet, about 8,000 feet

3. *P. balsamifera*, Linn, Brandis 476. Vern *Phals*, *makal*, *gakhshu*, *pakh*, *bit*, *kimal*, Pb, *Berfa*, *changma*, *yarpa*, *maghal*, *mahal*, W. Tibet. A large tree. Bark grey, thick, rough, with longitudinal fissures. Wood light grey, soft to moderately hard. Annual rings distinctly marked. Pores very small and numerous in the spring wood, extremely small, scanty, and in short radial and oblique lines in the firmer autumn wood. Medullary rays very fine, uniform, numerous.

. 4,000 feet Extends to Afghanistan, a weight of 32 lbs per cubic foot. The wood is grown for fuel in the inner and full of balsamic juice, which also exudes on a fresh cut between the bark and the wood.

H 136 Lahoul, about 9,000 feet the, 32 lbs. similar to old, shewn, the 30 lbs. per cubic foot.

ORDER XCVIII. CUPULIFERÆ.

Four Indian genera, *Quercus*, *Castanopsis*, *Carpinus* and *Corylus*. Four other genera are found in the world three of which, *Castanea*, *Fagus* and *Ostrya*, contain grown in various localities, and especially in a large number of places in the Himalayas

and the hills of the North-West Provinces, in Darjeeling and in the Khasia Hills. The experiment is as yet quite recent, and results are not sufficiently certain yet; but considering the large number of plants now growing and many favourable reports, it is probable that the experiments will be successful in some localities. *Fagus sylvatica*, Linn., is the 'Beech' Tree of Europe; and *Ostrya carpinifolia*, Scop., the 'Hop Horn-beam' of the Mediterranean region.

Pores generally arranged in radial lines or tails (not in *Fagus sylvatica*, *Castanea fulgens* and *Corylus Colurna*); medullary rays generally of two classes, broad and fine (not in *Castanea Vesca*, *Castanopsis* and four species of Indian Oaks). Most species have a distinct heartwood, exceptions are *Corylus* and *Carpinus*.

## 1. QUERCUS, Linn.

A large genus, one of the most important, not only in India and Europe, but also largely represented in America, Japan, and other parts of the world. It contains nearly 300 known species, of which 30 to 40 are probably Indian. The following list is taken from Alphonse De Candolle's Monograph in the Prodromus, Vol. xvi., those lately described by Kurz being given in brackets:—

### SECTION I. LEPIDOBALANUS.

<i>Q. Griffithii</i> , Hook. f. and Th.	Khasia Hills, 5,000 to 6,000 feet.	Nepal.	North-West Himalaya.
<i>Q. semecarpifolia</i> , Sm.		Nepal.	North-West Himalaya.
<i>Q. Ilex</i> , Linn.		Nepal.	North-West Himalaya.
<i>Q. dilatata</i> , Lindl.		Afghanistan.	North-West Himalaya.
<i>Q. serrata</i> , Thunb.		Nepal, Khasia Hills.	
<i>Q. lanuginosa</i> , Don.		Kumaun, Nepal.	Outer North-West Himalaya.
<i>Q. incana</i> , Roxb.			laya.

### SECTION II. PASANIA.

<i>Q. Amherstiana</i> , Wall.; Kurz ii. 484. Wood used for boat building. Weight 58 lbs. (Wallich).	Upper Tenasserim.		
<i>Q. Fulconeri</i> , Kurz, in Journ. As. Soc. Bengal xlv. p. 197; Burma For. Fl. ii. 485]	Assam, Tenasserim.		
<i>Q. mitis</i> , Alph. DC.	Upper Tenasserim.		
<i>Q. fenestrata</i> , Roxb.	Sikkim, Khasia Hills, Eastern Bengal, Tenasserim.		
<i>Q. dealbata</i> , Hook. f. and Th. Vern. <i>Dingy</i> , Khasia.	Nepal, Khasia, Hills, Eastern Bengal, North-East Himalaya, Eastern Bengal, Burma.		
<i>Q. spicata</i> , Sm.			
<i>Q. pachyphylla</i> , Kurz]	Sikkim.		
<i>Q. lappacea</i> , Roxb.	Assam, Eastern Bengal, Burma.		
<i>Q. ta</i> , Roxb.	Sikkim, Eastern Bengal, Burma.		

### SECTION III. CHALANUS.

Sikkim, 5,000 to 8,000 feet.	
Khasia Hills, 5,000 feet.	Chittagong, Burma.
	Sylhet, Burma.

- Q. aculeata* Sm Himalaya Khasia Hills  
*Q. lamellosa* Sm Nepal Sikkim Bhutan  
 6 000 to 9 000 feet  
 Ava, Prome Arracan Hills 4 000 to 5 000 feet  
 Martaban to 4 000 feet

SECTION IV CRYMAYDOBALANTS

- Q. lanceolata* Roxb Sikkim Assam Eastern Bengal

- Q. xylocarpa* Kurz in Journ As Soc Beng 196  
*Q. eumorphia* Kurz n 487  
*Q. bancana* Scheff Kurz n 485  
*Q. Olla* Kurz in Journ As Soc Beng xlv 197  
*Q. nov sp Vern Dingwa* Khasia Hills Assam  
 6 000 feet  
 Martaban Hills 3 000 to 7 000 feet  
 Arracan Martaban Hills 6 000 to

It is most important of the non Indian Oaks are described in Brandes For Fl pp. 483 to 487 and in other works such as *Alathien s Florie Forest ere* we need there fore merely say that the British Oaks are *Q. pedunculata* Ehrh and *Q. acutiflora* Sm usually *Q. Suber* duced by Vallonea O and dyeing is *Q. Agilops* Lam

Wood brown, very hard to extremely hard heavy generally with a distinct, darker colored heartwood. Pores small to large, arranged in irregular radial lines or elongated patches. Annual rings very indistinct, and not marked as in the case of European oak by a belt of larger pores in the spring wood (*Q. Griffithii* and *Q. serrata* are an exception to this). As regards the medullary rays, two types may be distinguished. In the first type (*Q. pachyphylla fenestrata* and *Lappacea*), there is only one class of medullary rays, all being very fine, very numerous, uniform and equidistant. All other species have two classes, namely, besides the very fine rays already described, a small number of broad, or very broad, rays. *First group*—All medullary rays very fine, very numerous, uniform and equidistant. Wood seasons well, does not warp or crack. *Second group*—Medullary rays of two classes, very fine and broad, the rise to that ap-

*I Q. Griffithii*, Hook f and Th Vern *Dingwa*, Khasia  
 A large deciduous tree Bark black, with deep vertical fissures  
 Wood brown, very hard Annual rings marked by a belt of large pores  
 in the spring wood. Pores small to moderate sized, large in the spring  
 wood, gradually decreasing outwards, enclosed in patches or radial way  
 groups of soft tissue Medullary rays of two classes numerous, fine,  
 uniform and equidistant rays and few broad to very broad rays Very

numerous, fine, parallel, wavy, transverse lines. The wood of this oak more resembles that of the English oak than any other we have examined.

Khasia Hills at 5,000 to 6,000 feet.

Growth fast, judging from our small specimen, and from the size attained by planted trees at Mongpu, Darjeeling. The timber is much used in the Khasia Hills for building and other purposes.

E 3337. Shillong, Khasia Hills, 5,000 feet.

2. *Q. semecarpifolia*, Smith; Brandis 479. Vern. *Barchar, jangal ka parangi*, Jhelam; *Kren, kharen, kwi*, Chenab, Ravi; *Karshu, karshi, karzu, sanj*, Sulej to Sarda; *Ghesi, kasu, Nep*.

A large evergreen tree with dark grey bark, often with protuberances arranged in horizontal lines. Heartwood grey, often with a reddish tinge, very hard. Annual rings marked by few somewhat larger pores in the spring wood. Pores small and very small, in long, narrow, wavy, radial bands. Medullary rays of two classes: very numerous, very fine, uniform, and equidistant rays; and very few, broad ones, not very prominent on a longitudinal section. Numerous faint, wavy, concentric bands.

Afghanistan, North-west Himalaya between 8,000 and 10,000 feet, Nepal, Bhutan. Growth difficult to distinguish, but from our specimens it appears to be moderate. Brandis says, 10 to 15 rings per inch of radius, and Aitkin, describing Wallich's specimens, gives 14.5 rings per inch. The rate of growth in the Deoban Forest was ascertained by counting the annual rings on 15 stumps of large trees. The result may be expressed as follows:—

Girth at five feet from the ground.	Corresponding radius (of wood only).	No. of rings.	No. of rings per inch.
ft. in.	inches.		
1	2.9	40	13.8
6	2.9	86	15.1
3	5.7	138	16
4	8.6	192	16.7
6	11.5		

This shows an increase of nearly 3 inches of radius every 50 years after the first 40, and an average growth of 15.4 rings per inch of radius. The examination of *copice* poles at an elevation of 9,000 feet in the same forest gave:

Jadi Block	Mohna	Poles.	Average diameter.	No. of rings.
			Inches.	
27	103		4.7	32.8
			4.8	34.4

or a general average for 130 poles of 4.8 inches average diameter to 34 rings or 10.4 rings per inch of radius.

Weight, our specimens give 53 to 54 lbs. per cubic foot. The tree often grows to large size, and has a fine, straight stem, but the wood, though probably better than that of the other North-West Himalayan oaks, is not exported, and only but little locally used. It is used for building, door-frames, bedsteads, carrying poles, belves and ploughs, is a good firewood, and yields good charcoal. The leaves are stored as winter fodder for cattle. It coppices well and reproduces well from seed, and is often gregarious, forming considerable extents of almost pure forest.

H 39.	Mahasu, Simla, 9,000 feet	...
H 72.	Nagkanda, Simla, 9,000 feet.	...
H 2893.	Nagkanda, Simla, 9,000 feet.	...

No E 264, sent by Dr Schlich from the Valley of Chumbi Tibet, between Sikkim and Bhutan, is a tree, the leaves of which resemble those of *Q. semecarpifolia*, but are smaller and less tomentose beneath. The wood is light coloured, the pores small, surrounded by soft tissue in long radial anastomosing bands. The wood resembles that of *Q. Ilex*, which or near which species it probably is.

3. *Q. Ilex*, Lindl, Brandis 480 *Q. Baloot*, Gmel *Q. Ballola* Desf The Holm Oak. Vern *Charrei, serai, badi, Afg, Sprecherei, pargar, kharanga*, Trus-Indus, *Chai, keharsu, kharen irri, gurn, heru, ban, big, brekke, Pb*

A moderate sized evergreen tree. Bark  $\frac{1}{2}$  inch thick, dark grey, tessellated, and cut into quadrangular plates. Heartwood red or reddish brown, very hard, durable. Pores small, uniform, in irregular anastomosing, radial bands. Medullary rays of two classes, numerous, very fine, uniform and equidistant rays, and fewer broad and very broad rays, the latter consisting of an agglomeration of finer rays, numerous fine, wavy, concentric rings of softer texture.

Afghanistan Suliman Range arid tracts of the Inner Himalaya generally between 3000 and 8500 feet Westwards to Southern Europe

H 1406	are annual
of radius	In 1880
Magshawe	counted
an average	number
at of the	European
tree varies	between 60 and 65 lbs per cubic foot
average of 61 lbs	but the third was old wood having been cut in 1867
For P 325	gives the weight as varying from 55 to 74 lbs per cubic foot. The wood warps and twists but when well seasoned it works admirably and takes a fine polish. It is largely used for tool handles and pieces are brought from the Suliman Range for that purpose. It is used for agricultural implements and yields good fuel.
re used	for fencing, and those
The acorns	are eaten in Kyrgyz,

4. *Q. alata*, Lindl, Brandis 482, Vern *Zakh, Kalistan, Bân, bany, banchar, barachar, barain, bann, parangi, chora, kahi ring, manr, murt, morn, martyhang, karsh, Pb, Morn, tilangsa, kilong, tilong, timshe, N-W P*

A large tree, changing its leaves yearly in spring at the time of flowering, but not quite deciduous. Bark dark grey, almost black, often with horizontal cracks, peeling off in longitudinal scales. Heartwood reddish grey, with darker streaks, very hard, seasons well and does not warp much, faintly but elegantly marked on longitudinal sections by the medullary rays. Pores small and very small, in groups, patches and irregular radial lines. Medullary rays of two classes, the broad rays more frequent, but narrower than those of *Q. incana*, the others are very fine, very numerous, uniform and equidistant. Fine, wavy, concentric bands irregularly distributed.

Afghanistan Suliman Range, North West Himalaya, between 7000 and 9000 feet. Growth moderate at first probably slow afterwards. The annual rings are not sufficiently marked for counting. Weight, 61 lbs per cubic foot. Major Kang gives

P. = 670. The wood is durable, and is used for building, for agricultural implements and jampun poles. The leaves are much lopped for fodder for sheep and goats, and untopped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting.

The tree copices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

II	935.	Hazara, Simla, 8,000 feet	.	.	.	.	.
II	4.	Mahasu, Simla, 8,000 feet	.	.	.	.	.
H	40.	Mahasu, Simla, 8,000 feet	.	.	.	.	.
H	2845.	Mahasu, Simla, 8,000 feet	.	.	.	.	.
II	2873.	Nagkunda, Simla, 9,000 feet	.	.	.	.	.
..	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.
69	.	.	.	.	.	.	.
58	.	.	.	.	.	.	.

5. *Q. serrata*, Thunb.; Brandis 486. *Q. polyantha*, Ldl. Vern. *Dingriliang*, Khasia.

A moderate-sized deciduous tree. Bark dark grey, rough when old, light silver grey and shining when young, deeply cleft with vertical fissures. Wood brown, very hard. Annual rings marked by a belt of large, sometimes very large, pores in the spring wood. Pores small to moderate-sized, increasing gradually to large and very large to the edge of the spring wood, enclosed in patches or radial wavy groups of soft tissue. Medullary rays of two classes: numerous fine, uniform and equidistant rays and fewer broad, very short rays. Very numerous fine, parallel, wavy, transverse lines. This much resembles *Q. Griffithii* in structure and also comes near that of the English oak. A Japanese specimen has the same structure, but the annual rings much more distinctly marked.

North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet. Growth, our specimen shows 3 rings per inch of radius. Wood used in Assam for building. In Japan the "*Tunuma?*" silkworm is raised on its leaves.

E 3339. Shillong, Assam, 5,000 feet.

6. *Q. launingnosa*, Don; Brandis 481. *Q. lanata*, Wall. Vern. *Rany*, *riang*, *ra bany*, Kumau; *Banga*, Nep.

*rang, ra bang, Kumaun; Banga, Nep.*  
A large, evergreen tree. Bark  $\frac{1}{2}$  inch thick. Wood greyish brown, very hard, warps and splits. Pores moderate-sized, in radial bands. Medullary rays of two classes, the broad rays prominent on a vertical section, giving the wood a handsome, mottled appearance. Numerous wavy, concentric lines.

Naimi Tai and a few other places in Kumanau, between 6,000 and 7,500 feet. Gargions, or associated with *Q. incana*. Growth, annual rings not sufficiently recognizable for certainty, but if the lines on our specimen are annual rings, the growth was moderate, 7 rings per inch of radius. Weight, our specimen gives 55 lbs. per cubic foot. Wood used for firewood, the leaves for cattle fodder.

H 2968. Naini Tal, 7,000 feet . . . : . . . lbs. 65

7. *Q. incana*, Roxb. Fl. Ind. iii. 642; Brandis 482. Vern. *Tarr*, Salt Range; *Rhin*, Hazara; *Rinj*, *vin*, Jhelam; *Ban*, *bang*, Pb.; *Bang*,

Kumann. A large evergreen tree. Bark dark coloured, rough, with cracks and fissures. Heartwood very hard, reddish brown, warps and splits. Annual rings indistinct. Pores small and moderate-sized, surrounded by



soft tissue and arranged in irregular patches and groups, and radial belts of two classes: numerous, very fine, uniform, and equidistant rays, and fewer very broad rays visible on a radial section as high, narrow, tapering, shining plates. Numerous faint, interrupted, wavy, thin, concentric lines.

are readily eaten by bears and monkeys which may to some extent account for its bad natural reputation on its use of profuse seedling.

H 899	Murree 7 000 feet	62
H 171	Kangra 6 000 (Stewart 1867,	67
H 1	Simla 7 000 feet	66
H 24		60
H 2867		
H 2	Malabar Simla, 7 000 feet	

**8 Q fenestrata**, Roxb Fl Ind iii 633 Brandis 489, Kurz ii 483, Gamble 78 Vern *Kala chakma*, Beng, *Pala katus*, Nep, *Aashkendung*, Lepcha, *Dingling*, Khasia, *Thilkyu*, Burm  
A moderate sized tree Bark  $\frac{1}{2}$  inch thick, rough greyish brown, deeply fissured into small rectangular plates Heartwood red, very hard Pores large, arranged in groups, and short or oblique belts Medullary rays very numerous, very fine, uniform and equidistant Numerous wavy, concentric bands

Eastern Himalaya between 5 000 and 8 000 feet Khasia Hills Eastern Bengal and hills of Martaban and Upper Tenasserim

7 in  
this  
3 7/8  
post

E 3398	Shillong Khasia Hills 5 000 feet	lb
B 652	Martaban Hills	66

**9 Q spicata**, Smith, Brandis 489, Kurz ii 486, Gamble 78 *Q squamata*, Roxb Fl Ind iii 638 Vern *Danwa singali*, phaco *singali*, *arkalia* Nep, *Bata chakma*, Beng, *Kachecung*, Lepcha, *Sah*, *Angori*, Ass, *Dingling*, Khasia, *Thilcha*, Burm  
A large, evergreen tree Wood red, very hard Bark grey, smooth Pores moderate sized and large, enclosed in soft tissue in groups, patches and radial belts Medullary rays of two classes numerous very fine, uniform and equidistant rays, and fewer broad and very broad ones, the silver grain being very prominent on a radial section Very numerous fine, parallel, wavy, transverse lines

Nepal Salium up to 5 000 feet Eastern Bengal Burma and Indian Archipelago Growth annual rings not recognizable Weight 69 lbs per cubic foot The wood is used for building in Assam and for charcoal in Darjeeling. It copries very freely and is often almost gregarious or mixed with chestnut *E. gelharadia* and *Acacia*. It is very durable and does not warp

P. = 670. The wood is durable, and is used for building, for agricultural implements and jampun poles. The leaves are much hopped for fodder for sheep and goats, and unupped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting.

The tree coppices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

The tree coppices well, and reproduces abundantly naturally, once established, require light to be let in, or they die off.

H	935.	Hazara, 8,000 feet	.	.	.	.	.
H	4.	Mahasu, Simla, 8,000 feet	.	.	.	.	.
H	40.	Mahasu, Simla, 8,000 feet	.	.	.	.	.
H	2845.	Mahasu, Simla, 8,000 feet	.	.	.	.	.
H	2873.	Nagkanda, Simla, 9,000 feet	.	.	.	.	.
..			.	.	.	.	.
193.			.	.	.	.	.

5. *Q. serrata*, Thunb.; Brandis 486. *Q. polyantha*, Ldl. Vern. *Dingyitiang*, Khasia.

1. A moderate-sized deciduous tree. Bark dark grey, rough when old, light silver grey and shining when young, deeply cleft with vertical fissures. Wood brown, very hard. Annual rings marked by a belt of large, sometimes very large, pores in the spring wood. Pores small to moderate-sized, increasing gradually to large and very large to the edge of the spring wood, enclosed in patches or radial wavy groups of soft tissue. Medullary rays of two classes: numerous fine, uniform and equidistant rays and fewer broad, very short rays. Very numerous fine, parallel, wavy, transverse lines. This much resembles *Q. Grisebii* in structure and also comes near that of the English oak. A Japanese specimen has the same structure, but the annual rings much more distinctly marked.

North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet. Growth, our specimen shows 2 rings per inch of radius. Wood used in Assam for building. In Japan the "*Xamant*" silkworm is raised on its leaves. E 3339. Shillong, Assam, 5,000 feet.

6. *Q. lanuginosa*, Don; Brandis 481. *Q. lanata*, Wall. Vern. *Rany*, *riany*, *rai ban*, Kumann; *Banga*, Nep. A large, evergreen tree. Bark  $\frac{1}{4}$  inch thick. Wood greyish brown, very hard, warps and splits. Pores moderate-sized, in radial bands. Medullary rays of two classes, the broad rays prominent on a vertical section, giving the wood a handsome, mottled appearance. Numerous wavy, concentric lines.

Naini Tal and a few other places in Kumaun, between 6,000 and 7,500 feet. Gre-  
garius, or associated with *Q. inana*.  
Growth, annual rings not sufficiently recognizable for certainty, but if the lines on  
our specimen are annual rings, the growth was moderate, 7 rings per inch of radius.  
Weight, our specimen gives 55 lbs. per cubic foot. Wood used for firewood, the leaves  
for cattle fodder.

for cattle fodder.

H 2968. Naini Tal, 7,000 feet . . . . . lbs. 55.

7. *Q. incana*, Roxb. Fl. Ind. iii. 642; Brandis 482. Vern. *Var.* Salt Range; *Rhin*, Hazara; *Rinj*, *rin*, Jhelam; *Ban*, *bang*, Pb.; *Banj*, Kumaun.

soft tissue and arranged in irregular patches and groups, and radial belts of two classes numerous, very fine, uniform, and equidistant rays, and fewer very broad rays visible on a radial section as high, narrow, tapering shining plates Numerous faint, interrupted, wavy, thin, concentric lines

not recognizable from the specimens We get 6 lbs per cubic foot average of our wood is very difficult to season it as it and makes good charcoal The acorns which may to some extent account for these seed us

H 899	Murree 7 000 feet	63
H 171	Kangra 6 000 (Stewart 1867,	63
H 1	Simla 7 000 feet	67
H 24		66
H 2867		60
H 2	Alabasu Simla 7 000 feet	60

**8 Q fenestrata**, Roxb R Ind in 633, Bhandis 489, Kurz in 483, Gamble 78 Vern *Kala chakma*, Beng, *Palle katu*, Nep, *Kashendung*, Lepcha, *Dingling*, Khasia, *Thilkyu*, Burm A moderate sized tree Bail  $\frac{1}{2}$  inch thick, rough, greyish brown, deeply fissured into small rectangular plates Heartwood red, very hard Pores large, arranged in groups, and short or oblique belts Medullary rays very numerous, very fine, uniform and equidistant Numerous wavy, concentric bands

Eastern Himalaya between 5 000 and 8 000 feet Khasia Hills Eastern Bengal and hills of Martaban and Upper Tenasserim

poses in the Khasia Hills

E 3338	Shillong Khasia Hills 5 000 feet	lbs
B 552	Martaban Hills	66

**9 Q spicata**, Smith, Bhandis 489, Kurz in 486, Gamble 78 *Q agumata*, Roxb R Ind in 638 Vern *Danwa singali*, *phaco singali*, *arkania* Nep, *Bata chakma*, Beng, *Kachekeng*, Lepcha, *Sak kingori*, Ass, *Dingling*, Khasia, *Thilcha*, Burm A large, evergreen tree Wood red, very hard Bark grey, smooth Pores moderate sized and large, enclosed in soft tissue in groups, patches and radial belts Medullary rays of two classes numerous very fine, uniform and equidistant rays, and fewer broad and very broad ones, the silver grain being very prominent on a radial section Very numerous fine, parallel, wavy, transverse lines

P. = 670. The wood is durable, and is used for building, for agricultural implements and japan poles. The leaves are much lopped for fodder for sheep and goats, and undipped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Matiyana. The latter forest contains fine trees, and is very interesting. The tree coppices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

II	935.	Hazara, 8,000 feet
II	4.	Mahasu, Simla, 8,000 feet
H	40.	Mahasu, Simla, 8,000 feet
II	2845.	Mahasu, Simla, 8,000 feet
II	2873.	Nagkanda, Simla, 9,000 feet

5. *Q. serrata*, Thunb.; Brandis 486. *Q. polyantha*, Tidl. Vern. *Dingrithiang*, Khasia.

A moderate-sized deciduous tree. Bark dark grey, rough when old, light silver grey and shining when young, deeply cleft with vertical fissures. Wood brown, very hard. Annual rings marked by a belt of large, sometimes very large, pores in the spring wood. Pores small to moderate-sized, increasing gradually to large and very large to the edge of the spring wood, enclosed in patches or radial wavy groups of soft tissue. Medullary rays of two classes: numerous fine, uniform and equidistant rays and fewer broad, very short rays. Very numerous fine, parallel, wavy, transverse lines. This much resembles *Q. Griffithii* in structure and also comes near that of the English oak. A Japanese specimen has the same structure, but the annual rings much more distinctly marked.

North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet. Growth, our specimen shows 9 rings per inch of radius. Wood used in Assam for building. In Japan the "*Kanuma?*" silkworm is raised on its leaves.

E 3339. Shillong, Assam, 5,000 feet.

6. *Q. laungmosa*, Don; Brandis 481. *Q. lanata*, Wall. Vern. *Ranj, riang, raibang, Kumau; Banga, Nep.*

A large, evergreen tree. Bark  $\frac{1}{4}$  inch thick. Wood greyish brown, very hard, warps and splits. Pores moderate-sized, in radial bands. Medullary rays of two classes, the broad rays prominent on a vertical section, giving the wood a handsome, mottled appearance. Numerous wavy, concentric lines.

Naini Tal and a few other places in Kumau, between 6,000 and 7,500 feet. Gregarious, or associated with *Q. incana*.

Growth, annual rings not sufficiently recognizable for certainty, but if the lines on our specimen are annual rings, the growth was moderate, 7 rings per inch of radius. Weight, our specimen gives 55 lbs. per cubic foot. Wood used for firewood, the leaves for cattle fodder.

H 2968. Naini Tal, 7,000 feet

lbs.  
55

7. *Q. incana*, Roxb. Fl. Ind. iii. 642; Brandis 482. Vern. *Tari, Salt Range; Rabin, Hazara; King, Jhelam; Ban, bang, Pb.; Bang,*

Kumau.

A large evergreen tree. Bark dark coloured, rough, with cracks and fissures. Heartwood very hard, reddish brown, warps and splits. Annual rings indistinct. Pores small and moderate-sized, surrounded by

soft tissue and arranged in irregular patches and groups, and radial belts. Medullary rays of two classes numerous, very fine, uniform, and equidistant rays, and fewer very broad rays visible on a radial section as high, narrow, tapering, shining plates. Numerous faint, interrupted, wavy, thin, concentric lines

= 491 "The wood is very difficult to season, it is good fuel and makes good charcoal. The acorns of profuse seedling monkey which may to some extent account for

H	899	Murree, 7 000 feet
H	171	Kangra 6 000 (Stewart, 1867)
H	1	Simla, 7,000 feet
H	24	" " "
H	2867	" " "
H	2	Mabasu, Simla, 7,000 feet

**8. Q. fenestrata**, Roxb Fl Ind in 633, Bhandis 489, Kurz n 483, Gamble 78 Vern *Kala chakma*, Beng, *Palle kalus*, Nep, *Kashirindung*, Lepcha, *Dingling*, Khasia, *Thilyga*, Burm A moderate sized tree Bark  $\frac{1}{2}$  inch thick, rough, greyish brown, deeply fissured into small rectangular plates Heartwood red, very hard Rays very numerous, very fine, uniform and equidistant Numerous wavy, concentric bands

E	3338	Shillong, Khasia Hills, 5 000 feet
B	552	Maitaban Hills

**9. Q. spicata**, Smith, Bhandis 489, Kurz n 186, Gamble 78 *Q. squamata*, Roxb Fl Ind. in 638. Vern. *Danwa singali*, *phaco singali*, *arkanta*, Nep, *Bara chakma*, Beng, *Achekeng*, Lepcha, *Sak kingori*, Ass, *Dingling*, Khasia, *Thitcha*, Burm A large, evergreen tree Wood red, very hard Bark grey, smooth Pores moderate-sized and large, enclosed in soft tissue in groups, patches and radial belts Medullary rays of two classes. numerous very fine, uniform and equidistant rays, and fewer broad and very broad ones, the silver grain being very prominent on a radial section Very numerous fine, parallel, wavy, transverse lines.

P. = 670. The wood is durable, and is used for building, for agricultural implements and jampun poles. The leaves are much lopped for fodder for sheep and goats, and undropped forests are rare. Near Simla, the chief localities where forests, pure or almost pure, of this tree are seen, are at Mahasu and on the east side of the ridge between Theog and Jaitiana. The latter forest contains fine trees, and is very interesting.

The tree copices well, and reproduces abundantly naturally, but the seedlings, when once established, require light to be let in, or they die off.

II	935.	Hazaru, 8,000 feet	.	.	.	.	.	.	.	155.
II	4.	Alabasu, Simla, 8,000 feet	.	.	.	.	.	.	.	61
II	40.	Alabasu, Simla, 8,000 feet	.	.	.	.	.	.	.	56
II	28 15.	Alabasu, Simla, 8,000 feet	.	.	.	.	.	.	.	69
II	2873.	Nagkunda, Simla, 9,000 feet	.	.	.	.	.	.	.	58

5. *Q. serrata*, Thunb.; Brandis 486. *Q. polyantha*, Ldl. Vern. *Dingritling*, Khasia.

' A moderate-sized deciduous tree. Bark dark grey, rough when old, light silver grey and shining when young, deeply cleft with vertical fissures. Wood brown, very hard. Annual rings marked by a belt of large, sometimes very large, pores in the spring wood. Pores small to moderate-sized, increasing gradually to large and very large to the edge of the spring wood, enclosed in patches or radial wavy groups of soft tissue. Medullary rays of two classes: numerous fine, uniform and equidistant rays and fewer broad, very short rays. Very numerous fine, parallel, wavy, transverse lines. This much resembles *Q. Griffithii* in structure and also comes near that of the English oak. A Japanese specimen has the same structure, but the annual rings much more distinctly marked.

North-East Himalaya and Khasia Hills, from 3,000 to 5,000 feet. Growth, our specimen shows 9 rings per inch of radius. Wood used in Assam for building. In Japan the "*Tsumama*" silkworm is raised on its leaves. E 33339. Shillong, Assam, 5,000 feet.

6. *Q. launingmosa*, Don; Brandis 481. *Q. lanata*, Wall. Vern. *Rany*, *iany*, *rai bany*, Kumaun; *Banga*, Nep. A large, evergreen tree. Bark  $\frac{1}{2}$  inch thick. Wood greyish brown, *Q. launingmosa* is a small tree with a spreading crown and small hands.

very hard, warty  
Medullary  
section, of  
wavy.

and 7,500 feet. Gre-

very branching  
marked by  
two broad ones;  
Khasia Hills and  
low. The tree cop-  
per inch of radius  
Daxfeelings, 5,500 feet  
Daxfeelings, 6,500 feet  
Vern. *Tari*,  
ny, Pb.; *Banj*,  
with cracks and  
and splits. An-  
sized, surrounded by







ght Wallich  
IV = 30 lbs  
ies is not de  
s well and is  
en pollarded  
and the branches burnt for manure The fruit is eaten it much resembles the  
gilbert both in shape and in flavour but has a thinner shell It is enclosed in a very  
prickly cup

E 494 Dula Jhar Dargeling Tera  
E 681 Khookloong Forest  
E 1204 Tezpur Assam  
43  
40  
44

2 C tribuloides, Alph DC, Bands 480 Gamble 79 *Castanea*  
*tribuloides*, Kurz II 480 *Quercus ferox* and *Q aimala*, Roxb FI Ind  
in 639, 640 Vern Tumare, Kumau, *Alure katus*, *Kolur*,  
*chris*, *mak*, *shingali*, Nep, *Bar kingore kanta singar*, Ass *Dingsat*,  
Khasia, *Singhara*, Tipperah, *Kanta lat barana*, Chittagong, *Kyansa*,  
Burma  
An evergreen tree Wood grey, moderately hard Annual rings  
marked by darker lines Pores moderate sized and large, in long wavy  
radial lines and bands Medullary rays numerous, very fine, uniform  
and equidistant Numerous fine, wavy, concentric lines

and charcoal forests are required as they often are by planters

E 626 Dula Jhar Dargeling Tera  
E 496 Khookloong Forest  
32  
39

3 C *rufescens*, Hook f and Th, Gamble 79 Vern *Daluc katus*,  
Nep, *Siriyakhu*, Lepcha, *Hingoi*, Ass  
A very large evergreen tree Wood grey, hard Annual rings  
marked by narrow belts of firmer texture Pores moderate sized and  
large, enclosed in soft tissue, arranged in irregular, radial bands and lines  
Medullary rays very fine, very numerous, uniform and equidistant, with  
numerous short, fine, transverse bars

Q  
is n  
this genus  
cup with long needle like prickles longer than those of *C indica*  
E 354 Hangu Forest Dargeling 7000 feet  
E 2407  
47  
45

and *C. oliviformis*, Nuttall, the Pear nut. The wood of all is very strong and elastic, and is used for building, but is not durable (von Mueller).

Wood moderately hard, shining. Pores moderate-sized, uniformly distributed, prominent on a vertical section. Medullary rays fine or very fine.

## 1. JUGLANS, Linn.

The Black Walnut wood of America is given by *J. nigra*, Linn.; and the Butter-nut tree of Canada is *J. cinerea*, Linn.

1. *J. regia*, Linn.; Roxb. Fl. Ind. iii. 631; Brandis 497; Kurz ii. 490; Gamble 80. The Walnut. Vern. *Charmaghaz*, Pers.; *Ughaz, waghaz*, Afg.; *Akhor, krot, dun*, Kashmir; *Kabotang, thanka*, Pb.; *Starga*, Ladak; *Ka*, Kunawar; *Akhor, kharot*, Kumaun; *Akhorot*, Hind.; *Akrot*, Beng.; *Kowal, Ipecha*; *Tagashing*, Bhutia.

A large tree with grey bark, characteristically marked by deep vertical parallel fissures,  $\frac{1}{2}$  inch to 2 inches thick. Heartwood greyish brown with darker streaks, often beautifully mottled, moderately hard, even-grained, seasons and polishes well. Annual rings marked by a sharp line. Pores moderate-sized, not very numerous, sometimes oval and subdivided, uniformly distributed, but somewhat more numerous in the spring wood. Medullary rays short, very fine. Numerous regular, fine, wavy, concentric lines. Pores visible on a longitudinal section.

Wild in the North-West and Sikkim Himalaya. Cultivated largely throughout the hills, especially in Afghanistan and Kashmir.

Growth variable; our specimens gave the following per inch of radius:—

H 9. 14 rings; H 15. 14 rings; H 125. 19 rings;

H 29. 3 rings; (young tree).

B 357. 9 rings; B 2441-a, 3 rings; b, 7 rings; B 2440, 4 rings.

So that the wood from the North-West Himalaya, omitting the specimen cut from a young tree, shows an average of 15 rings, and that from Sikkim an average of 6 rings per inch of radius.

Weight: European Walnut weighs 40 to 48 lbs. per cubic foot; our specimens give

North-West Himalaya 41 lbs., Sikkim 33 lbs. on an average. The tree reaches a very

large size. Brandis describes trees up to 28 feet in girth and 100 feet high from the

North-West Himalaya; in Sikkim it often reaches 100 to 120 feet in height with a

girth of 12 feet or more. It is being grown in plantation at Rangbui and other places

near Daryeeling. The wood is extensively used for furniture throughout the Hima-

laya, and its principal use is for gun-stocks. In Daryeeling it is occasionally used

for shingles by the Bhutias, but is not so good as chestnut. Before it became scarce

in the forests it was largely used for house-fittings, and many of the older houses in

Daryeeling have their doors and windows and other fittings almost entirely of

Walnut. The bark is used as a dye and in medicine; and is exported to the plains

for cleaning the teeth. The twigs and leaves are used for fodder. It is commonly

cultivated for its fruit throughout the Himalaya; the wild tree has a thick shell and

small kernel, and is rarely eaten; the cultivated trees are of numerous kinds, one

of the best being the thin-shelled or *Kaghazi* variety. A clear, good description

of oil is made from the fruit, and the rind is used for tanning and dyeing.

lbs.

H 3163. Dungsagalli, Hazara, 7,000 feet

H 9. Matiyama, Simla, 7,000 feet

H 29. " " " "

H 15. Jubal, 4,000 feet

H 41. Madhan, 6,000 feet

H 780. Chamba, 4,000 feet

H 125. Ralla, Kulu, 6,000 feet

H 428	Duram block	Deoban Jamsar, 6,000 feet	E 357	Takdah Forest, Dargyeling, 5,000 feet	E 2440	Dargyeling 6,000 feet	E 2441	Rangitum Forest, Dargyeling, 5,000 feet	33
43									37
14.									33

## 2 ENGELHARDTIA, Lessch

Three species though Brandis, p 500 thinks that the two described are probably varieties only of one and the same, i.e., *E. spicata* Kurz n 491, is a tree of the Eng forests of Martaban and Tenasserim

1. *E. Colebrookiana*, Lindl, Brandis 499 Vern *Trinar takh*, Pb, *Mlowa, goblat noua, bodat noua, mao*, Kumanun, *Kusam, Banda* A small deciduous tree Bark grey Wood grey with a reddish tinge, moderately hard, even-grained, seasons and polishes well, but is not durable Annual rings faintly marked Pores moderate sized and large, mostly oval and subdivided, uniformly distributed Medullary rays fine, uniform, equidistant, numerous Pores marked on a longitudinal section

Growth, our specimen shows 6 rings per inch of radius Weight 33 lbs per cubic foot

H 241 Garwal Hills (1868)

14.  
33

2. *E. spicata*, B<sup>1</sup>, Brandis 500, Gamble 81 *E. Korbueghiana*, Lindl *Juglans pterococca*, Roxb Pl Ind n 631 Vern *Silapoma*, Hind, *Mlowa, mohna*, Nep, *Suria*, Lepcha, *Bolas*, Beng, *Kunungach*, Ass, *Bor patia jam*, Cachar, *Dinglabad*, Khasia, *Takru*, Gwo A large, handsome, deciduous tree Character and structure of the wood similar to that of *E. Colebrookiana*, showing a beautiful grain on a radial section Faint concentric lines joining the pores

Teral and outer hills of Eastern Himalaya up to 6000 feet Chittagong and Burma Growth fast 3 to 5 rings per inch of radius Weight Wallich gives 40 or 100 lbs per cubic foot The wood is used in Sil him for tea boxes and building, in the Khasia Hills and Cachar for planking and spoons It does not warp The tree copries very freely, and coprice woods almost pure or mixed with oak and chestnut, are not uncommon near Dargyeling

E 653  
E 687  
E 2412.

14.  
33  
36

## ORDER CI GNETACEÆ.

Two genera, *Gnetum* and *Ephedra*, the first containing 5 species, chiefly of the moist zones, the latter 2, of the arid zone and inner arid Himalaya

*Gnetum scandens* Roxb Pl Ind n 518 Brandis 502 (*G. edule* B<sup>1</sup>, Kurz *olue* y, B<sup>1</sup> ym, Western Ghats Kurz n 490, is a large scandent shrub of Chittagong and Burma, *G neglectum* B<sup>1</sup>, is a climber of African and South Tennesse

Linn.; Kurz ii. 497; Roxb. Fl. Ind. iii. 518, is an evergreen tree of the forests of south Tenasserim, whose bark is made into strong cords, and whose leaves are eaten as spinach.  
 The wood consists of a large number of distinct wedge-shaped liguous masses which are arranged in concentric circles and separated by cellular tissue. It resembles the wood of Menispermaceae. (Brandis.)  
*Ephedra vulgaris*, Rich.; Brandis 501. Vern. *Asmānīa*, *būdshūr*, *cheva*, Pb.; *Khandū*, *Khannu*, Khammar; *Tse*, *tsupall*, *lwano*, Ladak, is a small rigid shrub of the inner arid, North-West Himalayan, with a fibrous tough wood and red fruit, which is sometimes eaten. *Fr. Alie*, C. A. Meyer; Brandis 501. Vern. *Alie*, Arab.; *Kuehan*, *niki karkun*, *bruttu*, *tandula*, *lastik*, *mungarwal*, Pb., is a gregarious shrub of the arid zone, in stony places in the Punjab and Sind.

the wood of Menispermaceæ. (Brandis.)  
*Ephedra vulgaris*, Rich.; Brandis 501. Vern. *Asmānia*, *būdshūr*, *cheva*, Pb.;  
*Khandu*, *Khanu*, Khamawar; *Tse*, *tsaput*, *lwano*, Ladak, is a small rigid shrub  
of the inner arid, North-West Himalaya, with a fibrous tough wood and red fruit,  
which is sometimes eaten. *E. alie*, C. A. Meyer; Brandis 501. Vern. *Alie*, Arab.;  
*Achean*, *niki*, *kurkan*, *brutia*, *tandula*, *lastik*, *mungarwa*, Pb., is a gregarious  
shrub of the arid zone, in stony places in the Punjab and Sind.

ORDER CII. CONFERENCE.

An Order containing many very important forest trees. It is found throughout the world, but chiefly in temperate and cold regions; and in India, with few exceptions, the species are confined to the Himalaya. The following list which is taken from Parlatore's Monograph in Decandolle's Protonotus, gives the five tribes and the most important genera, those found in India being given in italics; the others are added in consequence of their being universally planted for ornament or for timber:—

[illegible]

*Alseodaphne* contains about seven species, most of which have been introduced and cultivated in gardens in India. *A. imbricata*, Pavon (Brandis 503) from the mountains of Chil, is well known in Europe; it is much grown in England and is hardy, though sometimes liable to be injured by frost. *A. excelsa*, R. Br., from Norfolk Island, is much planted in Calcutta, where also may be seen *A. Cunninghamii*, Ait., of Queensland, *A. Cookii*, R. Br., of New Caledonia, and *A. Bidwellii*, Hook., the Bunya-Bunya Pine of North-East Australia. *Dammara australis*, Lamb, is the Kauri Pine of New Zealand, which, though much cut, still forms forest occasionally and gives a valuable timber. *D. alba*, Rumpff, of the Moluccas, yields the resin called Dammar. *Cunninghamia sinensis*, R. Br. is a large tree of Southern China. *Sequoia* contains two Californian species: *S. gigantea*, Torrey, the *Wellingtonia* or Mammoth Tree, which reaches over 300 feet in height, with a girth of 80 to 100 feet; and *S. sempervirens*, Endl., the Redwood, which reaches to 300 feet in height, with a girth of 55 feet (see Brandis 504). *Taxodium distichum*, Rich., is the Cypress of the swamps of the Southern States of North America. *Callitris quadrivalvis*, Vent.; Brandis 535; Mathieu Pl. For. 453, is a large tree of the forests of Algeria. Of *Thuja* or Arbor Vitæ trees, three species occur in North America, giving a light, soft but durable, building timber. *Biota orientalis*, Endl. (Brandis 531) is the Arbor-Vitæ of China and Japan, occasionally cultivated in India.

The wood of Coniferous trees is without vessels, hence, on a horizontal section, without pores. It consists of medullary rays and long wood

cells tapering at the ends, in the case of most species these wood cells are large and visible under the lens. The annual rings are, as a rule, distinctly marked by a belt of thick-walled wood cells in the outer (autumn) wood and a belt of larger and thin-walled wood cells in the inner (spring) wood.

In the case of the Juniper, Cypress, Yew and *Podocarpus*, the timber belt of autumn wood is narrow, and the whole structure of the wood, therefore, is homogeneous. On the other hand, in the case of the Pines, Firs, Cedar and Larch the wood consists of alternate layers of soft spring wood and firm autumn wood.

The turpentine (resin) is secreted in large, branching, intercellular ducts, lined by thin-walled cells. These cavities are called 'resinous ducts,' and they are of two classes, *vertical*, running with the wood cells parallel to the axis of the stem, and *horizontal* ducts, running with the medullary rays. The horizontal ducts can, as a rule, only be seen under the microscope, they will therefore, not be generally noted in the following descriptions. The vertical ducts appear on a cross section as scattered pores varying in size. Resin is also found in parenchymatous cells with straight ends, which are found mixed with ordinary wood cells. This is the case in Cypress.

The timber is homogeneous in the case of Cupressineae and Taxineae, but, as explained, in the case of Abietineae it consists of alternate layers of soft spring wood and hard autumn wood. The value of the timber of Abietineae for building purposes depends in a great measure upon the greater or less proportion of the firmer belt of autumn wood and also upon the more or less spongy nature of the spring wood. Under certain circumstances, for instance, the timber of *Deodai* has an extremely soft and spongy spring wood, and a comparatively narrow belt of autumn wood. Such timber is probably less durable and not as strong as timber grown under other circumstances, which have a less spongy spring wood and a larger proportion of firm autumn.

structure may be noticed in the case of,

ous trees, and it is a subject worth careful enquiry how far durability and strength are affected by these characters, and to determine the conditions of growth under which the wood of coniferous trees exhibits the varieties of structure here adverted to. It is generally supposed that slow-grown timber of coniferous trees is heavier and more durable than timber of the same species which had grown more rapidly. This, however, is not always the case. The following are instances of a light weight in the case of slow-grown timbers —

<i>Pinus cecelsa</i>	H 110	H 302	(JL 11)	20	37
<i>Cedrus Deodara</i>					

Logs which contain much resin are heavier than those which contain little resin.

With few exceptions the wood of coniferous trees was as hard as will support its weight, the weight per cubic foot running from 20 and 40 lbs, with few exceptions, such as *Larix*, which weighs over 50 lbs.

# I PINUS, Linn

Five Indian species, the whole genus occurring in British India

The rates of growth shown by our small specimens are, per inch of radius—		Ings.	
H. 13	•	E. 704 (large round, 2 ft. diameter)	11.7
H. 93	•	E. 2435	28
H. 602	•	E. 2436 (planted tree 20 years old)	about } 4.5
O. 3003	•	18	



bars  $1\frac{1}{2}'' \times 0.8'' \times 0.9''$  is given as 37 lbs. and the value of P. 522. The wood is extensively used in the Khasia Hills for building and other purposes. It is very rich in resin.

E 797. Kansas Hills

3. P. Merksusi, Jungs. Kuzh. 499. Verh. Tsinu-ben, Burm.

A large tree with thick, rough bark. Heartwood yellowish brown with dark streaks, moderately hard, exceedingly resinous. Structure similar to that of *P. Kasya*.

Tropical forests of Burma on the Thoungyeen river, associated with *Dipterocarpus tuberculatus*. Our specimen shows a moderate growth, 11 rings per inch of radius; its weight is 51 lbs. per cubic foot. Major Seaton gives 54 lbs. The wood is sometimes brought to Moumein for mast pieces, but the difficulties of land and water transport are very great, almost preventing its extraction at a profit. Splinters are extensively used for torches.

B 547. Thungyeen, Burma . . . . . 51

4. P. Gerardiana, Wall.; Brandis 508. Vern. *Chilghoza*, *jalgboza*, Afg.; *Chiri*, *prila*, *mirri*, *galboja*, *galgaja*, *Chenab*; *Kashti*, *Ravi*; *Ri*, *ri*, *Kunawar*; *Kannuchi*, *koninuchi*, *kannuchi*, *shangti*, W. Tibet; the seeds, *neza*.

A moderate-sized tree, with very thin, smooth, grey bark, exfoliating in large thin scales, leaving shallow, rounded depressions; cracked only in very old trees. Heartwood yellowish-brown, hard, durable, very resinous. Resinous ducts scattered, similar in size to those of *P. excelsa*, prominent on a vertical section.

Inner dry and arid North-West Himalaya, found in isolated areas of no great extent, generally between 6,000 and 10,000 feet, mountains of North Afghanistan and Kabulistan. Growth, specimen H 991 gives 24 rings, but appears to have been cut from a branch; H 1405, of old heartwood, gives 13 rings. Weight, 44 to 47 lbs. per cubic foot. The wood is rarely used, as the tree is valued for its edible seeds; it is, however, sometimes hollowed out for watercourses, and is used for the hook which attaches the seat to the rope in a single-rope swing-bridge. The seeds are a staple article of food in Kunawar, and other parts of the Himalaya; they are largely brought into India from Afghanistan. They are oily, with a slight turpentine flavour, and are generally roasted and eaten at dessert.

H	991.	Kunawar, Punjab,	" "	(Stewart, 1867.)	.	:	:	: .	:	. : .		lbs.
H	1405.	Chehab,	" "		.	:	:	:	:	:	.	44
					.	:	:	:	:	:	.	47

H 1405. Cheneab, " "

5. *P. excelsa*, Wall., Brandis 510; Gamble 82. Vern. *Pinn*, Afg.; *Bidar*, Hazara; *Chil*, *chir*, *chillu*, *chittu*, *chid*, Kashmir to Jannsar; *Chilla*, Garbwal; *Kal*, Beas, Sutlej; *Lam*, Chamba, Kunawar; *Yara*, *gar*, *yaro*, Kashmir; *Shomshing*, *lmsing*, Lahoul; *Raisalla*, *lamsing*, *byans*, Kumaun; *Tongschi*, Bhutan.

A large tree with greyish brown bark, cut into small, rather regular plates by shallow fissures  $\frac{1}{2}$  inch thick. Heartwood distinct, red, moderately hard. Annual rings distinctly marked by a narrow outer belt or line of compact wood, inner belt not spongy. Medullary rays very fine and very numerous, prominent on a radial section. Vertical resinous ducts scattered, smaller than those of *P. longifolia*, very numerous and prominent on a vertical-section. Himalaya, between 6,000 and 10,000 feet, occasionally found as low as 5,000 feet



and as high as 12,500 feet from the Indus to Bhutan, extending into the inner and tract Mountains of Afghanistan and South Macedonia. The wood is more durable than that of *P. longifolia*, but less so than Decid. As a rule, the tree grows most rapidly up to a certain age at

Height	Age	Mean radius	No. 1	" 2	" 3
67	49 years	10.5	1	2	3
78	"	9.5			
8	"	10.75			
9.5	"				
11	"				
13	"				
14.5	"				
22	"				
27	"				
65	"				

giving 22, 27 and 65 rings respectively, we have radius, but more information is much required. Port of 1877 the following measurements of trees in Jangarkalaon and Deoban Reserves are given —

Height per inch	Age	Mean radius	No. 1	" 2	" 3
47	49 years	10.5	1	2	3
58	"	9.5			
60	"	10.75			

from 26 to

of Chit or the fire. It is used for house building, shingles, water channels, wooden spades and other implements. It gives an excellent charcoal for iron smelting. The wood is extracted, as is that of bark is used to roof huts.

ry good even on hill sides or prefer to grow on sandy

Height	Age	Mean radius	No. 1	" 2	" 3
923	49 years	10.5	1	2	3
901	"	9.5			
140	"	10.75			
609	"				
37	"				
2871	"				
1403a	"				
1403b	"				
H 1403f	"				
H 1404	"				
H 1407	"				
E 2463	"				

## Pinus, Linn.

are from the Himalayas, and are now being discovered in Cyprus. The wood is more durable than that of *P. longifolia*, but less so than Decid. As a rule, the tree grows most rapidly up to a certain age at



Note—The Scaled Forests are marked B.

No. \_\_\_\_\_  
Raffles Hotel  
Singapore

**Dr. WTA**

Dr. wira (Naldebura) Forest, altitude about 7,000 feet

FOREST	No of trees examined.	Age of 1st class trees	Age of 2nd class trees	D.F.	REMARKS
1 Bhagurath { Exd by Dr Brandis Exd by Mr A D Campbell	4	229	143	86	Forests with a slow rate of growth
	18	169	148	48	
6 Swat River 7 Phula Kuden S 8 Mandu (Jangi) S 9 Chini S 10 Nachar S 11 Pori Kuram, Akpa measured at 12 Kiba S 13 Sleepers from Chenu at Lahore Hal	13	214	158	56	Age of 1st class trees above 140 years
	18	169	148	48	
	13	189	142	47	
	3	154	133	44	
	7	160	119	41	
	10	156	112	44	
	7	154	110	44	
	2	153	115	38	
	6	152	91	61	
	30	149	112	37	
	9	145	106	39	
	5	138	100	38	
	20 Roga S 21 Dippi S 22 Yak Baran S 23 Topan and Kshang S 24 Mebar S 25 Chag 26 Suma (north side young trees) 27 Jhelam 28 Kaddi (between Maljama and Nag Kanda)	50	134	97	
4		131	93	41	
4		132	98	34	
4		130	96	34	
7		130	91	39	
3		125	80	45	
39		124	88	36	
15		119	86	33	
2		117	88	29	
3		116	87	29	
5		113	85	28	
7		113	83	30	
5		110	87	23	
29 Suma (south side) 30 Kankume Shong S 31 Kavi timber good growth 32 Kappa D ppi Kusthal (Hapar) S 33 Janee S 34 Ylonge (lower part of forests) S 35 Jannuar Hwar 36 Suma (north side large trees) 37 Taranda 38 Chaeo Jamsantung S 39 Sarnuche (level ground) S 40 Nagadar	1	94	65	9	Forests with a rapid rate of growth
	9	81	67	24	
	10	81	66	25	
	4	81	63	29	
	8	80	66	24	
	3	80	66	24	
	2	76	57	19	
	17	71	53	18	
	7	71	53	19	
	4	67	49	18	
	6	65	47	18	
	10	63	44	18	
	8	50	31	16	



29 years. At this rate of growth they would reach 4½ feet in girth in 70 years, and 6 feet in 89 years.

Agement of the Forests in  
The Dandabul plantation  
1866 were examined with

No	Age	Girth (average)	Height	Rings per inch
Planted in	1864	2	12	3
"	1866	5	10	47
—a fast rate of growth				

In the Kulu forests the following measurements were made —

No	Mean radius Inches	No of rings	Rings per inch of radius
1	5	60	12
2	7	70	10
3	10½	137	13
4	6	80	14
Average			
12½			

1	6	35	58
2	5	48	96
3	5	26	52
4	22½	88	39
Average			
61			

1	8	65	81
2	6½	67	103
3	9	67	74
4	10-7½	83	77
Average			
84			

1	14-75	94	64
2	17½	103	69
3	23-75	93	43
Average			
55			

1	150	17½	869
2	100	14-00	714
3	196	17½	1136
4	175	20	875
5	175	14	1250
6	120	13-50	888
7	195	17	1146
8	175	25	7
9	400	37-50	1060
10	175	18	973
11	190	23-50	803
Average			
917			

Sandhar Forest 6500 feet  
elevation, soil good, a  
succession of terraces,  
with steep slopes be-  
tween

Betajur (good soil)

Sum Forest (poor soil)

Deoban Forest

Alhobal Forest

Average	10-53
5-62	24
9-11	21-5
10-24	21
8-29	20-75
9-58	26
14-53	19
9-64	20-75
12-58	18-75
9-68	23-75
9-93	23-75
12-36	21-75
22-38	13
7-60	25
12-85	7
9-22	18
6-42	24
3-80	50
11-18	17
9-80	20
8-96	29
10-36	25
18-62	16

Phulga Forest, 7,000 feet,  
forest very fine, soil  
good, a succession of  
terraces. Rock granite.

The average result of the measurements of these 48 trees is 9.5 inches per inch of radius, showing that in the forests of Kulu it may be expected that Decodar reaches 4½ feet in girth at an age of 82, and 6 feet in girth at an age of 109 years, which is good growth for forests which must be looked on as in the second category. In the just published 'Memorandum on the Forests of the Khyam Assigned Districts' by Mr. C. Bageshawe (Indian Forester, vol. vi, p. 28) a few measurements on sample areas of 2 acres each are recorded as follows:—

No. of trees. Mean radius. Mean No. of rings. No. per inch of radius.

(1) S.-E. aspect, 8,600 feet	6	7.5 inches	191	26.5
(2) E. to N.-E. aspect, 8,500 feet	20	9.4	191	20.3
(3) N.-W. aspect, 8,700 feet	7	10	223	22.3
(4) S. aspect, 8,660 feet	5	12.2	148	14.5

The average of these measurements gives nearly 21 rings per inch of radius, equivalent to an age of 241 years corresponding to 6 feet in girth. This is entirely in accordance with Dr. Brandis' division of the Decodar forests, for such forests as those of Afghanistan will naturally come into the first category. We may, therefore, say that there is nothing to be obtained from measurements made since the publication of the 'Forest Flora of N.-W. and Central India' to alter materially the statement therein made that the average ages of 6-ft. girth trees are—

1st Division	above 140 years.
2nd Division	from 110 to 140
3rd Division	under 110

*Girth and height at different ages*.—The proportion between the height and girth naturally depends, to a very great extent, on the condition of the forest in which the trees are found; isolated trees will naturally increase in girth more than in height, while trees grown in dense forest will run up fast in height at the same time that the increase in girth is slow. The pole forests examined at Mahasu, whose measurements are given on page 402, showed trees which varied in age from 15 to 35 years, in radius from 13 to 30 inches, and in height from 23 to 50 feet. When young Decodar grows slowly, Brandis says it attains 12 to 20 inches only during the first 3 to 4 years. But further information regarding the increase in height of Decodar at different ages is much wanted.

*Crop of timber per acre*.—Little information on this point has been collected since the publication of the 'Forest Flora of N.-W. and Central India,' where the subject is discussed at pp. 521-522.

The results of surveys given in the Basasahr Report are there quoted and here reproduced, they give—

No	Locality	Area surveyed Acres	Age of forest Yrs	Trees per acre	Crop per acre
1	Mayabak Forest	0 69	70	54	2 464
2	Khathwa	0 46	84	69	3 604
3	Chidara	0 34	83	70	4 323
4	Kunden	1 60	180	56	5,512
5	"	0 33	180	90	8 972
6	Kunawar Nachar	2 30	250	62	12 300

In para 21 of the Mahan that locality would be, at 80 y The valuations made in the

No	Acres	Average Per acre	Under 4/6	4 6 to 6	above 6.	Total	Per acre
1	2	66	30	30	26	122	61
2	2	48	37	37	62	168	84
3	2	41	17	17	20	98	49
4	2	23	17	17	37	77	39 5
Average		41 5	22 25	35 5	36 25	116 25	68 1

Thus, the Jannuar and Kunawar data would give, as far as the information we have goes, about the following —

Forest 80 years old	No of trees of 2 higher classes.	Cubic contents.
250	64	3 464
180	73	7,242
250	62	12,300

while the Kurum countings give, for forests which lie between 180 and 250 years, in all probability, 36 trees of the two higher classes per acre. With regard to the weight of Deodar and its transverse strength, the following experiments are available —

Experiment by whom made	Year	Wood whence procured.	No of expert men	Size of bar	Weight	Value of P
Col Macdagan, R.E.	1858	Punjab	1	2 x 1 x 1	23 06	626
"	"	"	4	3 x 1 x 1	"	630
"	"	"	4	3 x 1 x 2	"	630
"	"	Garhwal	1	2 x 1 x 1	21 65	627
"	"	"	3	3 x 1 x 1	"	630
"	"	"	4	3 x 1 x 2	"	630
Major Robertson and Captain Henderson.	1856	Punjab	10	2 x 1 x 1	"	628
Major Cunningham	1854	"	20	2 x 1 x 1	26 70	640
"	"	"	13	various	"	643 unseasoned.
Captain W Jones	1844	Kunawar	10	various	40	not measured.

Experiment by whom made.	Year.	Wood whence procured.	No. of experi- ments.	Size of bar.	Weight.	Value of P.
Rai Kanhya Lal*	1876	Ravi Ujh Chenab. Sutlej Ravi Sutlej Ujh Chenab. Sutlej Chamba	4 4 4 8 8 8 8 8 8 12	12 × 6 × 4 " " " " 8 × 6 × 3 " " " " " " 12 × 3 × 3 12 × 2.9 × 2.9 " " " " " "	38 35 33 34 38 34 31 34 35 36	331 304 316 215 367 387 341 315 351 330 302
Dr. Warth	"	Punjab, different localities.	8 1 1	"	36.6 35 31	302

NOTE.—The Roorkie experiments gave a mean of 657 as the value of P. for Punjab timber, and 692 for Garhwal timber. It has since been proved that these values were too high, and the experiments of Rai Kanhai Lal, who operated on larger pieces gave a mean of 331. The working value of P. as taken by the Department Public Works in the Punjab is now 300.

Deodar wood is extremely durable, being by far the most durable of the woods of the Himalayan Conifers. It is the chief timber of North-West India and is used for all purposes of construction, for railway sleepers, bridges, and even for furniture and shingles. An oil is obtained from the wood by destructive distillation; it is dark-coloured, thick, and resembles crude turpentine. It is used for anointing; the inflamed skins which are used for crossing rivers; and as a remedy for ulcers and eruptions for mange in horses and sore feet in cattle.

Rings per inch  
of radius.

940.	H	Chenab Forests	.	.	.	34
902.	H	Siti Valley, Chumba	.	.	.	32
900.	H	Havi Forests	.	.	.	36
616.	H	Beas Forests (Kulu)	.	.	.	42
617.	H	Sutlej Forests (Bussahr)	.	.	.	31
16.	H	Cheog Forests, Simla, 7,000 feet	.	.	.	41
42.	H	Mahasu Forest, Simla, 8,000 feet	.	.	.	35
3058.	H	" "	"	"	"	42
3096.	H	" "	"	"	"	42

3. ABIES, Tournef.

Three Indian species. The Spruce Fir of Europe is *A. excelsa*, DC.; Brandis 526, and is nearly allied to, and much resembles, the Himalayan *A. Smithiana*. The Silver Fir of Europe is *A. pectinata*, DC.; Brandis 528, which is similarly related to *A. Webbiana* of the Himalaya; while the Himalayan *A. dumosa* finds its counterpart in the Hemlock Spruce of Canada, *A. canadensis*, Michaux (Brandis 527). Nearly related to this last is the Douglas Spruce, *A. Douglasii*, Lindl., a tree which forms extensive forests in North-West America, attaining a height of 300 feet and more, and furnishing a valuable strong timber. It is extremely fast grown and has succeeded admirably in Great Britain. Many other species of *Abies* are in cultivation in Europe.

Wood generally not resinous (the resin being usually found in the bark), light-coloured, almost white, not homogeneous, consisting of alternate layers of soft spring wood and hard autumn wood. Vertical resinous ducts scanty.

Cones at the ends of branches, drooping or horizontal,

scales persistent.

Cones 1 inch

White beneath

*A. Webbiana.*

*A. dumosa.*

*A. Smithiana.*



1. *A. Smithiana*, Forbes; Brandis 525; Gamble 82. *A. Khutrow*, London. The Himalayan Spruce. Vern. *Wesha, bayur*, Afg.; *Kachal, Kaeham*, Hazara; *Kashmir*; *Kewars, ban hidar, sangat, salla, sarei, kauri, ros, rag, rdo, bang re, krok*, Pb. Himalaya; *Dos, Havi, Han, raring, re, Suley, Rai, Jamsar*; *Kandere, re, rhat, rdo, khutrai, ridda, ragha, morinda, kail, kilu, Garhwal, Kumaun; Sekshing, Bhutia*.  
A lofty tree, with rough greyish-brown bark, cut into small quadrangular plates by shallow furrows. Wood white, with a reddish or brown tinge, a little harder than that of *A. Weddiana*. The inner belt of annual rings soft and spongy. Vertical resinous-ducts scanty, visible on a vertical section. Medullary rays fine and extremely fine, very numerous, prominent on a radial section.

North-West Himalaya between 7,000 and 11,000 feet, Sikkim and Bhutan in the inner valleys between 7,800 and 10,000 feet, mountains of Afghanistan, Kashmir and Gilgit. Regarding the rate of growth of Spruce, very little information has yet been collected in Mr. Ribbentrop's "Working Plan of the Kalatop Forest, 1873," the measurement of 10 trees are given thus —

and light Regarding the rate of growth of Spruce, very little information has yet been collected in Mr. Ribbentrop's "Working Plan of the Kalatop Forest, 1873," the measurement of 10 trees are given thus —

No	Locality	Girth at base	Height	Age	No of mugs per bunch
1	Bandraban	68 inches	108 feet	125	116
2	"	68 "	104 "	112	102
3	Kalatop	65 "	80 "	70	67
4	"	64 "	98 "	74	72
5	Jagota	89 "	82 "	80	56
6	Near house	69 "	114 "	70	63
7	"	90 "	—	237	165
8	Dainkund	102 "	142 "	310	191
9	"	87 "	125 "	202	146
10	"	90 "	125 "	183	128

Circle, 187  
Block, 524  
show a mean and a  
is as far as the averages can be taken for all the trees counted, no more.

Radius	Average number of rings	or, per inch	showing that the growth in Deoban Forest seems to get slower as the trees get older. The figures further shew that the following are the average ages for different	Births.—
0—2 inches	163	.		
2—4 inches	194	.		
4—6 inches	225	.		
	11-25	.		

18 inches	36	70
	"	51
	"	112
20 inches	57	91

[illegible]

shade, and it generally makes very quick growth the first year, yearly shoots 18 to 24 inches being not uncommon.

H 3165.	Dungagalli, Hazara, 7,000 feet	lbs.
H 775.	Kalatop Forest, Dalhousie, 7,000 feet	31
H 3.	Mabasu Forest, Simla, 8,000 feet	28
H 12.	" " " "	32
H 43.	" " " "	32
H 2898.	Nagkanda, Simla, 9,000 feet	32
H 3032.	Hattu Forest, Simla, 9,000 feet (young tree)	39
H 420.	Mohna Block, Deoban Forest, 8,000 feet	26

E 965 sent by Dr. Seelich from the Chumbi Valley, Tibet, between Sikim and Bhutan, from about 9,000 to 10,000 feet, is a species of *Abies* closely allied to *A. Smithiana*, but with shorter needles and smaller cones. It is probably undescribed. The structure of the wood is identical with that of *A. Smithiana*.

**2. A. dumosa**, Loudon; Brandis 527; Gamble 83. *Pinus Browniana*, Wall. The Indian Hemlock Spruce. Vern. *Changathasi dhup*, *thi-gia*, *thingdani sul*, Nep.; *Tangshing*, Bhutia; *Semadung*, *chemdang*, Lepcha. A large tree, with thick, rough bark. Wood white, soft, with a slight pinkish tinge. Resinous ducts scanty.

North-East Kumaun, Nepal, Sikim between 8,000 and 10,500 feet. Growth, our specimens shew the following:—E 377, 17.5 rings; E 968, 11.5 rings, average 14.5 rings per inch of radius. Weight, 27 to 29 lbs. per cubic foot. The wood is used in Sikim for shingles. The bark is also used for roofing.

E 377.	Phallalooing ridge, Daryeling, 10,000 feet	lbs.
E 968.	Chumbi Valley, Tibet, about 10,000 feet	27
		29

**3. A. Webbiana**, Lindl.; Brandis 528; Gamble 82. *A. Pindrow*, Royle. The Himalayan Silver Fir. Vern. *Palidat*, *rewar*, Jhelam; *Bat*, *bidar*, *tung*, Kashmir; *Dhunu*, *rag*, *vail*, *pe*, *re*, *salle*, *sara*, Chamba; *Tos*, Kulu; *Spun*, *pun*, *krok*, *kare*, Kunawar; *Bilarda*, *thawera*, *Shali*; *Burta*, *pindran*, *pindrar*, *Hattu*; *Kudrom*, *Matiyana*; *Burwl*, *burra*, *bidlu*, *Bhaji*; *Kalrai*, *sarai*, *chur*, *Kotkai*; *Rako*, *row*, *chilrow*, *kilawanta*, *Chor*; *Morinda*, *Jauansar*; *Ragha*, *rao*, *ragha*, *vansla*, *vassala*, Kumaun; *Waman*, *Byans*; *Gobria sulah*, Nep.; *Dumshing*, Bhutia.

A lofty evergreen tree. Bark smooth, silvery on young stems, on old stems brown, cut into long, narrow scales by anastomosing spiral clefts, rough,  $\frac{1}{4}$  inch thick. Wood white, soft. The inner zone of each annual ring is soft and spongy. Medullary rays very fine and exceeding-ly fine, very numerous, not prominent on a vertical section. Vertical resinous ducts very rare.

Himalaya, from the Indus to Bhutan; in the North-West Himalaya between 7,000 and 13,000 feet; in the inner ranges of Sikim and Bhutan, between 9,000 and 13,000 feet; in the outer ranges it does not descend below 10,000 feet. Not much more information is available regarding the rate of growth of Silver Fir than there is that of Spruce. The Kalatop Working Plan and Deoban Report again afford most of the information. The measurements of 10 trees in Kalatop are given thus:—

No.	Locality.	Girth at base.	Height.	Age.	No. of rings per inch.
1.	Bindraban	78 inches	110 feet	170	13.7
2.	"	"	106	170	19.1
3.	Kalatop	"	97	85	7.9
4.	"	"	93	72	6.7

No	Locality	Girth at base	Height	Age	No of nodes per inch
5	Jagrola	72 inches	90 inches	73	6.4
6	"	65 1/2 "	90 "	73	8.3
7	Dankund	82 "	120 "	248	19.0
8	"	77 "	103 "	192	16.7
9	"	72 "	120 "	195	17.0
10	"	80 "	108 "	223	17.6

as follows —

Radius	Average number of rings	or, per inch	The Kanjatra figures further show that the following are the average ages for different girths —
0-2 inches	16.7	8.35	
2-6 inches	19.2	9.6	
4-6 inches	17.3	8.6	

Girth	Radius	Area
18 inches	2.9 inches	25
36 "	6.7 "	60
34 "	8.6 "	81
72 "	11.5 "	113

show an  
informa-  
P = 4.0,  
rth, gave

t well as  
t Aluree  
sawar and  
a bark is  
used for roofing shepherds' huts, in Sikkim it is used for troughs for the salt which is  
given to sheep grazing on the higher hills. On the Jhelam the twigs and leaves are  
cut and stored for winter use as fodder and litter for cattle

H 934	Hazara, 7,000 feet
H 774	Kalatep forest, Dalhousie, 7,500 feet
H 2895	Hattu, Simla, 9,000 feet
H 3031	Hattu, Simla, 9,000 feet
H 65	Nagbanda, Simla, 9,000 feet
H 421	Thoma Block, Deoban Forest, 8,000 feet
E 369	Sandukpho, Dargelung, 11,500 feet
E 2137	Chumbi Valley, Tibet, 10,000 feet
E 964	Chumbi Valley, Tibet, 10,000 feet

#### 4. LARIX, Tournef.

and Altai mountains

Wood resinous, with a distinct red heartwood, not homogeneous, consisting of alternate layers of soft spring wood, and hard autumn wood. Large vertical resinous ducts.

1. *L. griffithii*, Hook. f. and Th.; Brandis 531; Gamble 83. Vern. *Bourgassella*, Nep.; *Sch, saar*, Sikkim.  
A deciduous tree, with reddish brown bark,  $\frac{1}{2}$  inch thick. Heartwood red. Inner zone of each annual ring soft and spongy, outer zone narrower, firm and shining. Resinous ducts scanty, large. Medullary rays fine and extremely fine, numerous, prominent on a radial section.  
Nepal, Sikkim and Bhutan, between 8,000 and 12,000 feet.  
Growth, our specimen shows 21 rings per inch of radius; its weight is 32 lbs. per cubic foot. The wood is considered durable, and is exported from Sikkim into Tibet. Hooker in Himalayan Journals, II, p. 44, says that he never saw the wood to be red but always white and soft. Our specimen, however, is red and closely resembles the wood of the European Larch.

One indigenous Indian species, three others generally cultivated. *C. glauca*, Lam. Brandis 534, is cultivated in gardens in Western India above Ghat.

## 5. CUPRESSUS, Linn.

Wood homogeneous, fragrant, the firm belt of autumn wood very narrow. Resin is found in parenchymatic cells with horizontal ends.

1. *C. torulosa*, Don; Brandis 533. The Himalayan Cypress. Vern. *Dev-did*, Ravi; *Deodar*, Kulu, Bhaji; *Gulla, gulari, kallain*, Simla; *Leauri, Jannsar*; *Kassalla, saur*, Kumaun; *Sauri, sraah-ryn*, Tibet.

A large tree. Bark  $\frac{1}{2}$  inch thick, brown, the outer layer peeling off in numerous long, narrow, thin strips, inner substance reddish brown. Heartwood light brown with darker streaks, very fragrant, moderately hard. Annual rings distinctly marked by a narrow, firm and dark coloured belt on the inner edge. Numerous intermediate, deceptive but not continuous, rings. Medullary rays very fine and extremely fine, very numerous. No vertical resinous ducts similar to those in pines; the resin is here contained in parenchymatic wood cells similar to those which form the tissue of the wood.

Outer ranges of North-West Himalaya, from Chamba to Nepal, scattered and in numerous isolated localities of greater or less extent, chiefly on limestone, between 5,500 and 9,000 feet.  
Growth slow. Stewart records twelve to eighteen rings per inch of radius; our specimens show: H 613 nine rings, H 61 thirteen rings and H 771 fourteen rings per inch of radius. The average weight of our specimens is 39 lbs. per cubic foot. The wood has been much used at Naini Tal for building, and is sometimes used for beams on the Ravi and Sutlej. In Kulu it is made into images, and is used for the poles which carry the sacred ark. It is often burnt as incense in temples.

H 36.	Tika, Simla, 8,000 feet	lbs.
H 61.	Kandru, Simla, 8,000 feet	34
H 771.	Belj, near Bassu, Chamba, 7,000 feet	42
H 613.	Kulu, 7,000 feet	36
		44

2. *C. funebris*, Endl.; Brandis 534; Gamble 83. Vern. *Chandang, tchen-den*, Bhutia.

A handsome tree with pendulous branches, and a fibrous brown bark, often planted in Nepal, Sikkim and Bhutan near temples and monasteries, and in China. Structure similar to that of *C. torulosa*.

E 972. Darjeeling Hills, about 5,500 feet . . . . . 34  
lbs.

3. *C. sempervirens*, Linn., Brandis 538. Vern *Sara, yaks, North-West India*

A tall tree. Bark thin, light brown, fibrous, peeling off in thin strips. Wood light brown, moderately hard to hard. Annual rings distinctly marked by the dark, narrow, firm belt of autumn wood. Medullary rays fine, brown, very numerous. Resin-cells as in *C. torulosa*. Cultivated in gardens in Afghanistan and North-West India, sometimes reaching 6 to 9 feet in girth, with 70 to 100 feet in height

O 3267. Saharanpur Gardens

37  
16c

## 6. JUNIPERUS, Linn.

Bark brown, fibrous, peeling off in narrow strips. Wood soft, very uniform, with narrow bands of darker and firmer tissue at the edge of each annual ring. Medullary rays short, fine and very fine, extremely numerous.

Four Indian species. Among exotic junipers the most important are *J. virginiana*, Linn., of the Atlantic coast of North America, and *J. bermudiana*, Linn., of the Bermudas, West Indies and Florida, which species mainly yields the wood of which pencils are made *J. drupacea*, Labill., Brandis 539, is a dioecious shrub with edible fruit, found in the mountains of Asia Minor and Syria, and cultivated in England.

Wood homogeneous, fragrant, generally of slow growth, the ring of firmer wood at the outside of each annual ring very narrow.

1. *J. communis*, Linn., Brandis 535. The Juniper. Vern. *Nach, pama, pethra, belar*, Kashmir, Chamba and Kulu; *Tang shur, kheta, lewar*, Kunawar; *Chini, shupa, Piti, Sdama, Lahoul; Chichia, Kumau.*

A large shrub, with thin, reddish brown, fibrous bark. Wood white, moderately hard, fragrant, with a small mass of darker wood near the centre. Wood cells large, visible under the lens. Medullary rays very fine, somewhat unequal in width.

H 137. Laboul, about 10,000 feet

H 302. The Cherash

Fruit is sweet, aromatic and resinous, it is sold in the bazar of North India as a medicine (*abhar, hiber*) and is administered in decoctions as a stimulant and diuretic. In Europe the berries are used to flavour gin.

This specimen shows cracks in the wood, which are filled with a white substance, probably carbonate of lime or magnesita. It turns an orange colour with dilute sulphuric acid.

E 796. Khasia Hills, 5,000 feet

lbs.  
45

This last has been identified by specimens to be undoubtedly *Taxus baccata*. The structure is identical with that of our other specimens, but the colour of the heartwood is not red like the rest of the specimens, but brownish white.

## 8. PODOCARPUS, L'Her.

Three species. *P. nervifolia*, Don; Brandis 541; Gamble 83. Vern. *Guns*, Nep.; *Dingsabaleh*, Khasia, referred by Kurz to *P. bracteata*, Bl., but kept separate by Parlatore, is an evergreen tree of Nepal, Sikkim and the Khasia Hills, up to 3,000 feet. The wood is considered to be superior and is held sacred in the Khasia Hills.

Wood homogeneous. Wood cells large, easily visible under the lens. Annual rings generally indistinct. No vertical resinous ducts. Wood very durable, not resinous.

1. *P. bracteata*, Bl. *Nageia bracteata*, Kurz ii. 500. Vern. *Jinari*, Cachar; *Thitmin* (Prince of Woods), Burm.; *Welimada*, And.

A large evergreen tree. Bark grey-brown, thin, fibrous, peeling off in narrow flakes. Wood grey, moderately hard, of very uniform grain and texture throughout. The annual rings are faintly marked by darker lines, but the texture of the different belts of one ring is uniform. Medullary rays extremely fine, closely packed. No vertical resinous ducts.

Khasia Hills, Burma, and the Andaman Islands.

Growth slow, our specimens average 15 rings per inch of radius. Weight, according to Brandis (*P. nervifolia*, *Thitmin*, No. 94 of Burma List of 1862), 50 lbs. per cubic foot, according to Bennett 34 lbs., our specimens give an average of 39 lbs. It is greatly esteemed by the Burmese. Dr. Mason says, "It is used by carpenters for various purposes, and the Burmese have a superstition that the beams of balances should be made of it." Major Berdmore says it is used to avert evil by driving a peg of it into a house-post or boat.

E 1277. Cachar . . . . .

B 508. Andaman Islands . . . . .

B 2265. " " (Major Ford, 1866) . . . . .

B 2556. " " (Home, 1874, No. 10) . . . . .

lbs.  
38 . . . . .  
37 . . . . .  
39 . . . . .  
41 . . . . .

2. *P. latifolia*, Wall.; Beddome t. 257. *Nageia latifolia*, Kurz ii. 500. Vern. *Soplong*, Khasia; *Nivambali*, Tinnevely; *Thitmin*, Burm. A large evergreen tree, with grey aromatic-wood, and structure similar to that of *P. bracteata*.

Tropical forests of Martaban and Tenasserim Hills; Hills of Tinnevely, at 3,000 to 5,000 feet (Beddome); Khasia Hills and Eastern Bengal (Parlatore). Weight, our specimen gives 33 lbs. The wood is used for similar purposes to that of *P. bracteata*.

B 569. Tonghoo, Burma . . . . .

lbs.  
33

E 3414 from a planted tree at Daryeeling is *Biota orientalis*, Endl. Bark thin, brown, peeling off in papery flakes, and with numerous resin-cells. Wood moderately hard, close-grained; heartwood dark reddish-brown, the annual rings marked by darker colour. Medullary rays numerous, fine, very short.

## ORDER CIII. CYCADACEAE

One genus, *Cycas*, including four species, *C. circinalis*, (Kurz n. 502) *C. revoluta*, (Kurz n. 503) *C. filix*, (Kurz n. 504) *C. dolabrata*, (Kurz n. 505). The seeds are ground into flour and used for food in Sumatra and Java. The wood yields a quantity of sago or starch, and the trunk, found in the coast forests of Sumatra and Java, is an evergreen palm like tree. *C. dolabrata* is cultivated in South India. The wood which is used to cure ulcers of the skin is found in South India and Ceylon. The seeds are ground into flour and used for food in Sumatra and Java. *C. dolabrata*, (Kurz n. 505), is a low stemless, palm like tree, common in the dry forests of Formosa, and yielding a whitish gum.

1. *C. pectinata*, Gmel.; Kurz n. 503; Gamble 84. Vern. *Thakal*, Nep. An evergreen, simple-stemmed, palm-like tree. Bark in horizontal folds, with diagonal clefts, making diamond-shaped bosses. Wood yellowish white, in narrow wedge-shaped plates, arranged in nearly concentric rings and separated by white tissue, which, like the central pith, is full of starchy granules.

in Sikkim.  
prove to be

the  
54

E 2439 Chenga Forest, Darjeeling, 1,000 feet  
E 877 Balasun Forest, Darjeeling, Terai

## II. MONOCOTYLEDONS.

## ORDER CIV. ZINGIBERACEAE.

ORDER CV. PALMÆ.  
trees, shrubs or climbers, found almost all  
in most arid zones and containing many of the

enatic  
nains,  
arden  
many  
a plant

Tribe I—Borassineae  
II—Coryphineae  
III—Phœnicineae  
IV—Arecineae  
V—Cocchineae  
VI—Lepidocarpaceae  
VII—Nipaceae  
*Horatius*  
*Corypha*, *Chamaetopis*, *Lavulona*,  
*Licuala*,  
*Pharis*,  
*Wallichia*, *Caryota*, *Arecia*, *Be-*  
*lunkia*, *Arenca*,  
*Coccoloba*,  
*Calamus*, *Plectocomia*, *Bor-*  
*lunda*,  
*Vigra*.

Besides these, several species from other countries are to be seen, cultivated, in India. The magnificent *Oreodoxa regia* from Brazil may be seen in Calcutta, where avenues of it have been planted in the Botanic Gardens, and isolated plants in the gardens of many houses.

The wood and bark are not distinct, but the stem generally consists of an inner softer, and an outer harder portion. The stem consists of a large number of scattered fibro-vascular bundles, embedded in soft cellular tissue. On a horizontal section the vascular bundles appear most numerous near the circumference of the stem; here they are small, very hard, and often nearly confluent, so as to form a hard ring. In the centre of the stem, the bundles are less numerous and generally not so hard as near the circumference. Consequently, the central portion of the stem is chiefly composed of cellular tissue which often decays, so that the centre of old palms is frequently hollow.

On a vertical section the fibro-vascular bundles appear like long wavy lines, which do not run parallel to each other. On a radial section the vascular bundles cross each other, and they can be traced from the base of the leaf, where they terminate, bending inwards to the centre of the stem and then outwards again towards the circumference.

The structure of each bundle is different in its upper and lower parts. In its upper part it contains *firstly*, vessels varying in size, which on a horizontal section appear as pores; *secondly*, elongated or polygonous cells, generally forming a mass of softer tissue immediately surrounding the vessels; *thirdly*, a mass of long, thick-walled fibres, of which the hard horny portion of the bundle is composed. In the lower part, the bundle is composed almost entirely of fibres without any vessels or cells.

A horizontal section shows the bundles near the circumference in their lower part; these therefore only consist of fibre, while towards the centre the upper part of the bundles is cut through and shows fibres, vessels and cells. It must not be forgotten that on a cross section the upper portion of the bundles is cut through near the circumference where they enter the leaf stalk, but these are cut through obliquely, and are easily recognised, and there are few of them.

## 1. BORASSUS, Linn.

### 1. B. flabelliformis, Linn.; Roxb. Pl. Ind. iii. 790; Brandis 544;

Kurz ii. 529. The Palmyra Tree. Vern. *Tal, tala, tar*, Hind.; *Tal*, Beng.; *Potu tadi* ♀, *penti tadi*, ♀ Tel.; *Panam, panave*, Tam.; *Mal, Tali, tale*, Kan.; *Tad, Guz, Tal*, Cingh.; *Htan*, Burm.

A large tree with tall cylindric stem, surmounted by a terminal crown of fan-shaped leaves. The young stems are covered with dry leaves or the lower part of petioles, while the old stems are marked with the hard, black, long and narrow scars of the fallen petioles.

Centre soft, but not often hollow. Fibro-vascular bundles black, crowded in the outer portion of the stem; if cut through at right angles they are oblong, generally with one large pore and a mass of cells at one end. Outer wood hard, heavy, and durable.

Cultivated throughout tropical India and beyond the tropics in Bengal; and the southern part of the North-Western Provinces.



The following expert witnesses have been made on the weight and transverse strength of the timber —

Weight	Val of 1
Found 60 lbs	811
60	811
63	811
72	811

A Vendas Ceylon No 83 bars 2 X 1 X 1"

Skiner Madras No 30 1863

Warrth in 1878 No W 2922

Salem No 15

The weights of

specimens gives 49

in a partly outside partly inside wood

is used for posts rafters and other purposes. The leaves are used for that

and basket work and for writing on. The pulp of the fruit is eaten and in Ceylon

is made into a preserve. Seemann says that the Dutch when they had power

sion of Ceylon considered the preserved pulp or Peratroo such a delicacy that large

quantities of it preserved in sugar were exported to Holland and Java. The chief

product however of the Palmyra Tree is the sweet sap which runs from the

peduncles cut before the rearing and collected in bamboo tubes or earthen pots tied to

the cut peduncle. Brandis Seemann says that in Ceylon the spathe is cut from the

end to end with thongs and then beaten and crushed between wooden battens for three

successive mornings that on each of the following four a thin slice is cut from the

points of the spathe while on the eighth day the sweet clear sap begins to exude

and is caught in earthen pots or bamboos. The sap is fermented in to today is

distilled or is made into sugar known as jaggery. The tree generally reaches in

40 to 60 and occasionally 100 feet high and often measures 18 to 24 inches in

diameter above the usually thick base

C 960 Guzerat Bombay

E 418 Jessore Bengal

W 767 South Kanara

W 863

W 2922 Malabar

D 1475 Salem Madras

B 663 Prome Bur a

B 2458 Myanourng Burma

No 15 Salem Collection

No 83 Ceylon Collection

## 2 CORYPHA, Linn

Five species C *Taliera* Roxb Fl Ind II 174 Brandis 549 Vern *Tara* *tilier*

larv 649 spiral 60 all 1000

1 C *umbra* *culifera*, Linn, Roxb Fl Ind II 177, Brandis 549,

Kurz II 524 The *Taliput* *Pala* Vern *Coliapana*, *Tam*, *Bine*,

Ban, *Tala*, *Cing*, *Pe beng*, *Burm*

A tall tree, with terminal flowers which dies after seedling. Wood

soft, with a hard and composed of black vascular bundles. The

lar bundles in the centre of the stem are soft

3 7

Give

Ceylon, measured: height of stem 84 feet, of flower panicle 21 feet, total 105 feet; girth at 3 feet from the ground round the persistent bases of the leaves 13 feet 9 inches, at 21 feet from the ground 8 feet 3 inches; age about 40 years. The leaves are very large, often 10 feet in diameter; they are made into fans, mats and umbrellas, and are used for writing on, as also are those of *C. Tulieria*. A kind of sago is yielded by the pith.

W 857. South Kanara.

Kurz joins *C. Tulieria* with this and *C. elata* with *C. Gédanga*.

### 3. CHAMÆROPS, Linn.

Of *Chamærops*, two or three species occur in India. *C. Aluticum*, Wall. Brandis 516. Vern. *Jhaurva*, *Jhaurva*, *lal*, Kumaun; *Tugru*, Nep. is a tall, handsome palm, found on the Thakul mountain in East Kumaun, at from 6,500 to 7,800 feet elevation, in damp, shady glens, with a north-west aspect. It is also found in one or two minor localities in Kumaun and in Nepal, and is, besides, considered to be probably the same as *C. khasiana*, Griff.; Kurz i. 527. Vern. *Pakha*, found in the Khasia Hills and on the hills of Marabau at 4,000 to 6,500 feet. The writer has once found small plants of what is probably this palm on Kisseroom, near Lumson, beyond Darjeeling, at 6,500 feet elevation. *C. Ritchiana*, Griff.; Brandis 517. Vern. *Alazri*, *nozari*, Trans-Indus; *Kiliu*, *kaliu*, Salt Range; *Pfisi*, *pesli*, *pease*, *pharwa*, Sind, Trans-Indus, the Punjab, Afghanistan and Beluchistan. Its leaves are used to make matting, fans, sandals, baskets, hats and other articles; its leaves and leafstalks give a fibre which is made into ropes, and its seeds are pierced and made into rosaries, and for sale for that purpose are exported from the Beluchi port of Gwadar to Mecca. (A beautiful collection of the products of this palm [P 1779] was sent to the Paris Exhibition of 1878 from the Punjab, chiefly from the Salt Range.)

### 4. LIVISTONA. R. Br.

*Livistona Jenkinsiana*, Griff.; Gamble 86. Vern. *Talainyom*, *tulac-myom*, *pur-bong*, Lepcha; *Yoko pat*, Ass. is an extremely handsome fan-leaved palm found in the forests of the Sivoke Hills in Sikkim and eastwards to Assam, where it is commonest in Nowgong and the Naga Hills. The leaves are largely used by Lepchas for thatching and for umbrellas, in Assam for the roofs of huts, boats and doolies, and for the large Naga-hats (often 3 to 4 feet in diameter, and called *ghapes*), and umbrellas (Nos. E 1728 to 1731, Assam). The tree reaches 30 feet in height, the wood is very soft, with white fibre-vascular bundles (No. E 2461, Sivoke Hills, Darjeeling). *L. speciosa*, Kurz, Journal As. Soc. Beng., xliii. ii., p. 204; For. Fl. ii. 526. Vern. *Thalu*, Magh; *Tau-ham*, Burm. is an evergreen, lofty palm of the forests of Chittagong the Pegu Yoma and Upper Tenasserim. Its leaves are sometimes used for thatching in Chittagong, instead of those of *Licuala*.

### 5. LICUALA, Rumph.

*Licuala* contains three Indian species. *L. paludosa*, Griff.; Kurz ii. 528, is an evergreen, gregarious palm of the tidal swamps of the Andamans. *L. peltata*, Roxb. Fl. Ind. ii. 179; Kurz ii. 527. Vern. *Patti*, *chattah-pat*, Ass.; *Kurud*, *kurkuti*, Beng.; *Sa-lu*, Burm.; *Kapadali*, And. is a peltate-leaved palm of the forests of Assam, Eastern Bengal, Chittagong, Burma and the Andamans, said to extend westward as far as Sikkim. It is used in Assam for umbrellas, and in the Andamans for thatching (B 1046, Andamans). In Chittagong it forms a great part of the undergrowth in some of the forests, notably the Kasalong Reserve, and its leaves, under the name of *Kuwuchhyapat* are universally used in the inner Hill Tracts for thatching, and when grass is scarce are largely exported to the plains. The stems are about 9 to 12 inches in girth, and 5 to 15 feet high; the wood is rather soft, and the vascular bundles evenly distributed, and dark coloured (B 3366 Kasalong Reserve, Chittagong). *L. longipes*, Griff.; Kurz ii. 528, is found in Mergui. The well-known walking sticks called 'Penang Lawyers' are the young trunks of *L. acutifida*, Mart., a very small palm of the Malay Peninsula.

## 9 PHENIX, Linn

Six to seven Indian species, *P. dactylifera*, Linn., Roxb Fl Ind iii 786, Brandis 552 Vern *Khajur*, *kajra*, is the Date Palm cultivated and self sown in Sind and the Southern Punjab, and producing the well known fruit *P. acutis*, Roxb Fl Ind ii 783, Brandis 555, Kurz ii 535, Gamble 86 Vern *Khajur*, *pind* *Khajur*, *jangle khajur*, Hind, Schap, Lepcha, Boichind, Mar, Chindi, Hindi, *Khajur*, Fern & Knuth, T no Kinn *'hinboung* Burm, is a low palm with a thick, the Juinna east-  
It chiefly grows  
fruit is eaten by  
in Cho't Nagpur  
*P. Onocleyana*  
lata from the Nilgiris *P. firs*.  
Vern *Chilla erla*, Tel, Ichat,  
near the sea at Corring, whose

Gamble 86,  
and Burton, but  
the stem is often eaten by Lepidochus

1. *P. sylvestris*, Roxb. Fl. Ind. m. 187; Brandis 554, Kurz n 585 The Wild Date Palm Vein *Khajur*, *Lajzi*, *salma*, *thakil*, Hind., *Pedda eta*, Tel., *Pernia eelcham*, Tam., *Ichal*, *kullu*, Kan., *Serindi*, Bear, *Boichand*, Mar., *Sindi*, Gondi.

A tree with ashy grey foliage, 30 to 40 feet high. Stem rough, with the prominent scars of fallen petioles. Wood light brown, the outer portion hard and durable. Vascular bundles less numerous than in *Borassus*, brown, horny, on a horizontal section circular or slightly oval, the fibrous portion uniform, enclosing the cells and vessels.

— From the 10th of December

Skinner in Madras, No 104, found Warth in 1878 found our specimen give

Weight 39 lb 5 oz  
= 175

After tubes and other purposes, the chief produce of the tree is the sweet sap which is collected by cutting a notch in the tree at the base of the lower leaves, the sap then flows for some time, and a thin slice is daily cut off the surface of the wound. A tree is usually fit to tap at 10 years old and remains yielding for about 20 years. The juice is either fermented or boiled down into sugar.

[illegible]

7. WALTICHA, Rozb.

Contains 1 or 2 Indian species: *H. densiflora*, *Martius*, Branden 619, Kurz, n. 632, Gamble 54 (*Hartia oblongifolia*, Griff.) Vern. *Kalya namu*, for *namu*.

Kumau; Ool, Lepcha; *Takosu*, Nep.; *Zanoung*, Burm., is a small stemless palm, common in the outer Himalaya, from Kumau eastwards, up to 4,000 feet, and in Eastern Bengal and Chittagong. In Kumau the leaves are used for thatch and in Dajeling for fodder for ponies. *W. caryotoides*, Roxb.; Brandis 550; Kurz ii. 532 (*Wrightia caryotoides*, Roxb. Fl. Ind. iii. 621) Vern. *Chilpatta*, *belpatta*, Chittagong; *Mochooma*, Magh; *Zanoung*, Burm., is a small palm of Chittagong and Burma. (Kurz refers to *W. caryotoides*, the *W. densiflora* of Brandis; this genus then requires further investigation). *W. nana*, Griff., is described as a small palm found near Gauhati in Assam. *W. disticha*, T. And. in Linn. Soc. Journal xi. 49; p. 6; found by Brandis as far west as Kumau in 1874. It grows to a height of 20 feet, and has distinct leaves joined at the base by a network of dark fibres. The Lepcha has felt it to eat the pith of the stem near the summit of the tree. Anderson says the berries, and perhaps the leaves, irritate the skin. The wood is soft, the stem almost hollow in the centre, and the fibrovascular bundles dark brown coloured (E 878, B 2460, Dajeling). *W. Yoma*, Kurz ii. 533. Vern. *Zanoung*, Burm., is an arborescent species of the Pegu Yoma, with longer pinne and the leaves spirally arranged.

## 8. CARYOTA, Linn.

Two, or perhaps three, species. *C. sobolifera*, Wall.; Kurz ii. 530. Vern. *Burattahad*, And., said by Mr. Homfray to be called the 'Sago Palm' (No. B 1045, Andaman Islands). Griffith describes a *C. obtusa* from the Mishmi Hills resembling *C. wrens*, but having more obtuse pinnules.

1. *C. wrens*, Linn.; Roxb. Fl. Ind. iii. 625; Brandis 550; Kurz ii. 530; Gamble 84. Vern. *Kungbong*, *szomng*, Lepcha; *Bara Jauar*, Ass.; *Salopa*, Uriya; *Mhar*, *marah*, *mar*, *jirung*, Tel.; *Conda-panna*, *erim-panna*, *utali-panna*, Tam.; *Bhyni*, *beina*, *bagn*, Kan.; *Berli*, Mar.; *Shunda pana*, Mal.; *Kittul*, *nepora*, Cingh.; *Hilyamban*, Magh; *Windo*, Burm.

A beautiful tree, with smooth annulate stem, large bipinnate leaves and wedge-shaped leaflets. The outer part of the stem is hard and durable and the vascular bundles crowded, black, very large.

Evergreen forests of western and eastern moist zone of India. On the Western Ghats it extends to near Mahabaleswar. It is common in Burma, Bengal, and Orissa, ascending in Sikkim up to 5,000 feet.

A. Mendis gives the weight at 71 lbs. per cubic foot, our specimen weighs 45 lbs. only, but perhaps contains more of the softer inner wood. The wood is strong and durable; it is used for agricultural purposes, water conduits and buckets. The leaves give the '*Kittul*' fibre, which is very strong, and is made into ropes, brushes, brooms, baskets and other articles; the fibre from the sheathing petioles and the peduncle is made into ropes and fishing lines, which are very strong. The interior of the stem is filled with a sago-like starch which is made into bread or boiled into gruel. Seemann says it is good and very nutritious. From the cut spadix large quantities of toddy are obtained, which is either fermented or boiled down into sugar. With regard to the length of life of the tree, Seemann says (*Popular History of Palms*, p. 135):—

"The *Caryotas* flower only once during their course of existence. The first spadix appears at the top of the tree; as soon as that has done flowering, others (latent buds) issuing from the axils, or former axils, of the leaves, make their appearance; this process, being of a downward tendency, is repeated until the last spadix, which may be looked upon as the death-knell of the plant, shears itself at the foot of the trunk, proclaiming that the hour of departure from life is at hand."

9 ARECA, Linn.

537 Roxb Fl Ind in 617, Kurz in. *Tru kuan thee*, Burm, *Abara-dah*, and the Andamans *A gracilis*, Kurz in 538) V Ass, is a small slender stemmed, often gregarious palm of the undergrowth in damp forests in Sikkim, Assam, Eastern Bengal and Burma, it is used for native huts and roofing in Assam. The outer portion is hard with closely packed fibro vascular bundles the inner part is so soft that the cane shunks in drying (B 3420 Dahpukote, Br Bhuban) *A hexasticha*, Kurz in Journal As Soc Beng xliii p 201, for Tlor, British Burma, in 539, is a small palm of Burma and *A costata* Bl, Kurz in 538 a palm of the Andamans Griffith describes several other species, such as *A tara* Buch from the Andamans (placed by Kurz under *A triandra* see above), *A law*, Singpho, of the Moga Hills, *A disticha*, Roxb Fl Ind in 620,

1 A Catechu, Linn, Roxb Fl Ind in 615, Brandis 551, Kurz in 536, Gamble 84 The Areca Nut or Betel Palm Vern *Supari*, Hind, *Gua*, Beng, *Poka*, oka, *vaka*, Tel, *Camngu*, paku, Tam, *Ahite*, Kan, *Adaka*, *avungu*, Mal, *Puwak*, Cingh, *Kuam-thee-beng*, Burm, *Ah-bud-dah*, *ah-pur-rud-dah*, And A tall tree, attaining 100 feet in height, with a slender, cylindrical, annulate stem, the inner part of which is generally hollow Vascular bundles brown, forming a hard rind on the outside of the stem. Cultivated throughout Tropical India A Mendis gives the weight per cubic foot at 57 lbs The wood is used for furniture and for scaffolding poles in Ceylon The sheaths

of betel palms are formed and these groves form often an extensive area and are commonly cultivated in India, and said by Kurz to be wild in the forests of Burma. Most villages in Bengal Burma and South India have their few of betel trees in tropical scenery Sundarbans W 709 South Kanara No 73 Ceylon Collection lb

10 PINIKOTI CODDA PANNA, Berry, Roxb Fl Ind in 621 Vern *Cod-da panna*, Tel, is a slender palm about 20 feet high found in the Travancore Hills

11 ARENGA, Labl

*A saccharifera*, Labl, Brandis 550 Kurz in 533 (*Saguerus Rumphii*, Roxb Fl Ind in 60) Vern *Toung ong* Burm is a common Malayan palm very commonly cultivated in India, and said by Kurz to be wild in the forests of Burma. The heart of the stem contains a large quantity of sugar and the cut flower stalks yield a sugary sap, made into at the base of the petioles for condige The palm dies a then useful for troughs and was so impressed with its general value in India. Griffith mentions another species, *A Hightu*, from the hills about Comblator

12. COCOS, Linn.

1. *C nucifera*, Linn.; Roxb. Fl. Ind. iii. 614; Brandis 556; Kurz ii. 540; Gamble 86. The Coconut Tree. Vern. *Narel, nariyal*, Hind.; *Narikel*, Beng.; *Tenna, tenga*, Tam.; *Vari kadam, lenkai, koddari*, Tel.; *Theupina, kinghenu, Kan.*; *Tenga, Mal.*; *Pol, Cingh.*; *Ong, Burm.*; *Jathiridah, And.*

A pinnate-leaved palm, with annulate, often curved stem. Outer wood close-grained, hard and heavy. Vascular bundles black or dark purple, closely packed in the outer part of the stem on horizontal section, circular or uniform, enclosing vessels and cells.

Weight. Value of P.

608	70	Skinner in 1862, No. 49, with Madras wood, found.
562	47	Puckle, 4 experiments in Mysore, bars $2\frac{1}{2}$ feet $\times$ 1 inch $\times$ 1 in.
...	70	A. Mendis, (Ceylon, No. 72, found
...	49	Warrth, in 1878, the average of our 3 specimens, found

The wood is commercially known as 'Porcupine wood'; it is used for rafters and ridge poles, house posts and other building purposes; for spear handles, walking sticks and faney work. The leaves are used for thatching, and the net of fibres at the base of the petioles is made into bags and paper, and is used in Ceylon for toddy straining. The cut flower stalks yield toddy which is fermented or made into sugar; the kernels of the nuts are eaten, and the sweet fluid of the young nut is a pleasant drink; the thick fibrous rind of the fruit is the 'Coir' fibre, used for ropes, mats, and other articles; the shell of the nut is made into spoons and cups and other utensils; while the oil obtained from the fruit is an important article of trade and is used for burning, for cooking and in the manufacture of candles and soap. In fact, the uses of the coconut tree are innumerable, and much has been written about them.

[illegible]

13, 14, 15. CALAMUS, PLECTOCOMIA, KORTHALSIA.

Perhaps no genera of Indian forest plants are so little known as these, even those comparatively accessible, like the canes of Dehra Dun and Dajeeing, being of very uncertain nomenclature. When the collection of specimens for the Paris Exhibition of 1878 was going on, large numbers of canes were received from Burma, Assam and elsewhere, accompanied by merely native names; and being, of course, stripped of their leaves, sheaths and flowers, and tied up in the bundles in which they are sold, they had to be rejected, as the principle was not to exhibit anything whose scientific name was not known.

As far as regards the canes of Burma and the Andamans, Kurz's Forest Flora and his 'Enumeration of Burmese Palms in Vol. xliii. of the Journal of the Asiatic Society of Bengal, 1874, are of great help; the canes of Sikkim are tolerably well known from Dr. J. Anderson's 'Enumeration of the Palms of Sikkim', in the Linnean Society's Journal, Vol. xi, 1869; those of Assam, Eastern Bengal and Chittagong are given in Griffiths's 'Palms of British India' and the 'Flora Indica' of Roxburgh; but the whole nomenclature is confused, and the difficulties in the determination of species are very great. The following list has been drawn up giving the Indian species described in those books which have been accessible, but it should be understood that

the list is merely compiled, and that no opinion whatever is given as to the value of the specific names —

### 13 GALAMUS

#### SECTION I — COLLEOSPATHE

##### A — Erect

- 1 *C. collinus*, Griff No 2  
Khasia Hills Upper Assam;
- 2 *C. macrocarpus*, Griff No 3 (under *C. erectus*, Kurz n 516 Enum 32)  
Bhutan Duars
- 3 *C. schizospathus*, Griff No 4, T And 1, Gamble  
Sikkim Khasia Hills
- E 3
- very close, as usual, towards the edge
- 4 *C. arborescens*, Griff No 5, Kurz n 516 Enum  
Pegu  
(B 1026 Toungoo, Burma)  
31 Vern *Danoung, kyenbanakyeu*, Burma  
5 *C. erectus*, Kurz n 516 Enum 32  
Burm 32 Vern *Bungotta*, Sylhet, *Theing*,  
Sylhet Chittagong, Pegu  
6 *C. humilis*, Kurz n 516 Enum 32  
Burm  
B — Scandent.
- 7 *C. flagellum*, Griff No 8, T And 2, Gamble 85  
Vern *Kabi bet*, Nep, *Reem*, Lepcha,  
*Nagolia bet* Assam  
8 *C. acanthospathus*, Griff No 9  
Khasia Hills
- 9 *C. Royleanus*, Griff No 11 (under *C. Rotang*, Lau, Brandis 559, Gamble 85)  
Dehra Dun, Northern Bengal
- 10 *C. Rotang*, Kurz n 516 Enum 32, Brandis 559  
(*C. Roxburghii*, Griff No 12) The com mon Khasia Vern *Bet, chachi bet*, Beng, Hind, *Pepu, prabba*, Central Provinces (O 1038, Dehra Dun)  
11 *C. tenuis*, Kurz n 520, Griff No 13, Kurz n 520, Enum 37, Brandis 559 Vern *Bandhar bet*, Chittagong, *Kring*, *Magh*, *Jalla bet*, Ass  
12 *C. polygamus*, Kurz n 520, Griff No 14, T And 3, Gamble 85 Vern *Dangur bet*, Nep, *Lal Lepcha*, *fasciculatus*, Kurz n 517, Enum 33, Brandis 559 Vern *Dara bet*, Beng, *Ayeng Khar*, Burma  
13 *C. leopoldae*, Griff No 15, T And 3, Gamble 85 Vern *Dangur bet*, Nep, *Lal Lepcha*, *fasciculatus*, Kurz n 517, Enum 33, Brandis 559 Vern *Dara bet*, Beng, *Ayeng Khar*, Burma  
14 *C. gracilis*, Kurz n 520, Enum 38 Vern *Napuri bet*, Beng, *Krupang*, *Magh*, *Kandi bet*, Ass  
15 *C. mitchamensis*, Griff No 17  
16 *C. floribundus*, Griff No 18  
17 *C. latifolius*, Kurz n 518, Enum 34, Brandis 560 Vern *Koral bet*, Chittagong, *Sun*, *Magh*, *Kamulha*, Burma  
18 *C. palustris*, Griff No 22 (under *C. latifolius*, Kurz n 518, Enum 34)  
Mergui

20. *C. extensus*, Roxb. Fl. Ind. iii. 777. Vern. *Den-gullar*, Sylhet.

21. *C. quinque-nervius*, Roxb. Fl. Ind. iii. 777. Vern. "

*Murru-gullar*, Sylhet.

22. *C. montanus*, T. And. 4; Gamble 85. Vern. *Gouri*, Sikkim, Bhutan.

23. *C. macrocaulus*, T. And. 5; Gamble 85. Vern. "

*Phekoi bet*, Nep.; *Ruebee, green*, Lepcha.

(E 1017, Darjeeling).

24. *C. incanus*, T. And. 6; Gamble. Vern. *Dangri bet*, Nep.; *Broot*, Lepcha (E 1016, Dar-

jeeling).

25. *C. andamanicus*, Kurz ii. 519, Enum. 35. Vern. Andamans.

*Chowdah*, And.

26. *C. ligrinus*, Kurz ii. 519, Enum. 36. Vern. *Lémé*, Burma, Andamans.

Burma; *Amidah*, And. (B 1012, Andamans).

27. *C. Hesperianus*, Kurz ii. 521, Enum. 39.

Tenasserim or Andamans.

28. *C. parviflorus*, Kurz ii. 521, Enum. 40.

Martaban.

29. *C. Guruba*, Mart.; Kurz ii. 522, Enum. 41. Vern. Chittagong and Burma.

(Four other species are given by Martius as occur-

ring in Tenasserim, called *C. platyphallus*;

*C. concinnus*, *C. nitidus*, and *C. melan-*

*acanthus*).

30. *C. Mastervianus*, Griff. No. 29, under *C. Guruba*, Assam.

*quabi-bet*, Ass.

Kurz ii. 522, Enum. 41). Vern. *Sundi-bet*,

SECTION II.—CYMBOPATHE.

31. *C. nutantiflorus*, Griff. No. 31.

Assam.

32. *C. Jenkinsonianus*, Griff. No. 32; T. And 7. (*Cym-*

*bospathes Jenkinsonianus* Gamble 85.) Vern.

Sikkim Terai, Diars and Assam.

33. *C. grandis*, Griff. No. 33; Kurz 523. (*Dæmono-*

*rops grandis*, Kurz Enum. 30).

Andamans.

34. *C. hypoleucus*, Kurz ii. 523 (*Dæmonorops hypo-*

*leucus*, Kurz Enum. 29).

Tenasserim.

Of these canes, *C. Rotang* is largely used in North-West India for chairs, blind and basket work. *C. latifolius* is much used in Burma for tying timber in rafts, and making the cables which stretch across the river at the Salween rope station. *C. montanus* is the best cane for suspension bridges and dragging logs in Sikkim, and *C. inermis* furnishes the finest 'alpenstocks.' No. E 1007 from the Sundarbans. Vern. *Gola bet*, has been pronounced by Dr. King to be a species new to India, which he has identified with *C. longipes*, Griff. No. 26, hitherto only known from Malacca.

# 14. PLECTOCOMIA.

1. *P. khasiana*, Griff. 106

2. *P. assamica*, Griff. 107

3. *P. himalayana*, Griff. 108; T. And. p. 11; Gamble

86. Vern. *Takri bet*, Nep.; *Kunool*, Lepcha.

4. *P. macrostachya*, Kurz ii. 514, Enum. 28

Tenasserim Hills.

# 15. KORTHALSIA.

1. *K. scaphigera*, Mart.; Kurz ii. 513, Enum. 25.

Andamans.

(*Calamosagrus scaphiger*, Griff. 29). Vern.

Boradah, paridah, And. (B 1041, Andamans).

2. *K. laciniosa*, Mart.; Kurz ii. 513, Enum. 26.

Tenasserim.

(*Calamosagrus lacinosus*, Griff. 27).



It may be useful to give the vernacular names of the canes sent from different localities for the Paris Exhibition, which it was impossible to name, as those who have

*Engkyeng, engkyeng, kyengbot, zanyong, khaboung, from South Kanara*  
*Hetha and nagabetha, and from the Andamans Boleah, jobetahdah, jobetah, and a*  
 palm called *chardah*

16 *ZALACCA WALLICHIANA*, Mart., Kurz n 511. Vern. *Kingam*, Burm., is an almost stemless palm of the tropical forests of Burma

17 *NIPA FRUTICANS*, Wurm., Roxb Fl Ind iii 650, Kurz n 511 Vern *Gulga, gabua, Beng, Da ne, Burm, Pootahada, And (Golpohat [fruits] Beng), is a large robust palm of the river estuaries and tidal forests of the Sundarbans, Chittagong, Burma and the Andamans. The leaves are used for thatching, and today is obtained from the spathe. The inside of the large fruit is, when young, edible, when old it is hard like ivory, but transparent (E 1530 Sundarbans)*

## ORDER CVI PANDANEÆ

Two genera *Pandanus* and *Avicennia* Of *Pandanus* the Screw Pines, there are which extend to Roxb Fl Ind iii *Thaly-* *ta, Beng, in swampy forest in Bengal* *Beddome coccavin, Kurz n* *O karyya, Cingh, is a palm-* *Western Coast Siam grey,* *outer wood moderately hard,* *st. spongy (E 473 B 2462,* *ut, Willd, Roxb Fl Ind iii* *Kea, kelyk, Keor, Beng,* *Algalik, Tel, Thalay, talum, Tam, Kaida, thala, Mal, Mdu karyya, Cingh;*

## ORDER CVII. LILIACEÆ.

*Kam lin nel, Burm, of the Andamans, and D apicata, Roxb Fl Ind ii 167, Kurz*

*n 515, also from the Andamans,*

*small trees D terniflora, Roxb*

*D atropurpurea, Roxb Fl Ind ii*

*Cordylone terminalis, Kth. Kurz n 515 (D racosa terminalis, Roxb Fl Ind ii,* *156), is a large shrub from the Molucca, now extensively grown in gardens in Bengal*

*and Burma.*

To this Order also belong *Saxifraga zeylanica, Willd, Roxb Fl Ind ii, 161 The* *Bowstring Hemp Vern Warba, murekura, muregi, Beng, Malat in ur, Saleu,*



Kanawar, Kwei Tibet, Pong, N. W. P.,  
 plains in the Eastern  
 Himalaya, Khasia Hills  
 (H 132 Kulu, L 1339,  
 E 3427, Darjeeling)

- 5 *A. khasiana*, Munro 28 Vern *Nandang*  
 Khasia, stem 8 to 12 feet  
 Stem about 6 to 8  
 6 *A. intermedia*, Munro 28  
 Sikkim 7,000 to 8,000  
 feet  
 7 *A. Hookeriana* Munro 29 Vern *Praong prong*  
 Lepcha, Singham, Nep stems 12 to 16 feet  
 This bamboo is common about Dumsong and  
 has handsome glaucous green stem, the nodes  
 marked by a bluish ring The seeds are edible  
 The leaves have conspicuous transverse veins  
 8 *A. elegans*, Kurz n 549 Stems 12 to 20 feet  
 Martaban Hills

GENUS II—THAMNOCALAMUS

- 1 *T. Falconeri*, Hook f, Munro 34, Brandis 563  
 Luemann and Nepal, at  
 8,000 feet  
 Himalaya from the Suley  
 (H 131 Kulu  
 E 3426, Tonglo, Dai  
 feeling 10,000 ft.)  
 2 *T. spathiflorus*, Munro 34, Brandis 563, Gamble  
 Vern *Kingall*, Janssar, *Purnio*  
 Lepcha, *Mgooray*, Bhutia The common  
 small bamboo of Hattu and Deoban The  
 hard yellow stemmed red branched bamboo  
 from Tonglo and the Singalla Range of  
 Sikkim is probably this species Transverse  
 veins prominent.

GENUS III—PHYLOSTACHYS

- 1 *P. bambusoides*, Sieb and Zucc, Munro 36  
 Mishmi Hills

GENUS IV—BAMBUSA

- 1 *B. Tula*, Roxb Fl Ind n 193, Munro 91,  
 Brandis 566, Kurz n 552 Vern *Pela*,  
 Hind, *Tula*, *Jwa miteenga*, *maita*, Bei g,  
 Waghah, Goro, *Madaecay*, Magh, *Lhewa*  
*thoukwa*, Butm The common Bamboo of  
 Bengal The wood is strong and the hairs  
 are used for roofing, and scalding, mat, and  
 other purposes  
 2 *B. nutans*, Wall, Munro 92, Brandis 567,  
 Gamble 87 Vern *Malibans*, Nep *Maia*,  
 Lepcha, *stueking*, Bhutia, *Bidhali*, *mukhal*  
 Ass, *Piche*, Sylhet A most beautiful species  
 largely planted near villages in Sikkim and  
 Bhutan.  
 3 *B. aggrinis*, Munro 93, Kurz 501 Vern  
*Tyeseke*, *Kaikwa* Butm said by Munro to  
 be scendent, by Kurz to be small and tufted,  
 and 15 to 20 feet high  
 4 *B. teres*, Ham, Munro 95  
*B. Falconeri*, Munro 95, Brandis 568 Vern  
 Bengal and Assam  
 6 *B. Kalcione*, Munro 95, Brandis 568 Vern  
 North West Himalaya  
 6 Eastern Bengal and  
 Assam  
 7 *B. Kalcione*, Munro 95, Brandis 568 Vern  
 North West Himalaya  
 8 *B. Kalcione*, Munro 95, Brandis 568 Vern  
 North West Himalaya

9. *B. Balcoca*, Roxb. Fl. Ind. ii. 196; Munro 100; Brandis 567. Vern. *Balku*, Beng.; *Betwa*, Cachar; *Bara baluka*, Ass. Stems 50 to 70 feet. The best Bengal species for building and scaffolding. It differs from *B. Tilda* by its larger leaves, not pubescent beneath, and having distinct transverse veins, which are not found in *B. Tilda*.

10. *B. arundinacea*, Retz; Munro 103; Beddome, cexxi, t. 321; Roxb Fl. Ind. ii. 191; Brandis 564; Kurz ii. 554. Vern. *Maqar, ntl*, Pb.; *Bans, kattang*, Hind.; *Walukanteh*, Garo; *Buriala*, Chittagong; *Mandagay*, Bombay; *Kati wandu*, Gondi; *Mangil*, Tam.; *Vedru*, Tel.; *Bidungulu*, Kan.; *Wa-nah*, Magh; *Kya-kat-ua*, Burm. Stems 70 to 90 feet, spinescent. Leaves small. This bamboo is of good quality and strong, and is used for all purposes. The stems contain much tabasheer, which is used in native medicine. As a rule all the clumps in one district flower simultaneously, but isolated flowering clumps are occasionally found. Flowering years in 1804, 1836 and 1868 are recorded on the western coast, but a flowering took place also in Kanara in 1864. (On this subject see Brandis, pages 565 and 566.)

11. *B. spinosa*, Roxb. Fl. Ind. ii. 198; Munro 104; Beddome cexxi; Brandis 566, Vern. *Behor*, Beng.; *Koto*, Ass.; *Kinkoit*, Cachar; *Taka-twa*, Burm. (not given by Kurz, or rather, united with *B. arundinacea*, probably; a view in which Brandis concurs).

12. *B. orientalis*, Nees; Munro 105; Beddome cexxi.

13. *B. vulgaris*, Wendl.; Munro 106; Beddome cexxii; Brandis 568. Vern. *Kulluk*, Bom-bay; *Una*, Cingh. Stems 20 to 50 feet, yellow or striped yellow and green. The leaves have well marked transverse veins.

14. *B. Brandisii*, Munro 109. (*Dendrocalamus Brandisii*, Kurz ii. 560.) Vern. *Ora*, Beng.; *Taryu-wah*, Magh; *Kyellowa, wabo*, Burm. A gigantic species, up to 120 feet high, stems often 30 inches in circumference. Flowered in Chittagong in 1879.

#### GENUS V—GIGANTOCHLOA.

1. *G. andamanica*, Kurz ii. 556. Vern. *Podah*, And. Stems 20 to 30 feet, thin, tufted; leaves used for thatching.

2. *G. auriculata*, Kurz ii. 557. Vern. *Ta-ta-ku-wa*, Burm. Stems 30 to 40 feet. *G. macrostachya*, Kurz ii. 557. Vern. *Madi*, Magh; *Wa-net*, Burm. Stems 30 to 50 feet.

#### GENUS VI—OXYTENANTHERA.

1. *O. nigro-ciliata*, Munro 128. Beddome cexxiii. (*Bambusa gracilis*, Wall.) Stems 30 to 40 feet. Western Ghats, Chittagong, Burma, Andamans, (B 1314, Youngoo.)

- 2 *O. albo ciliata*, Munro 129 (*Gigantochloa albo ciliata*, Kurz n 555) Vern *Wa pyoo galay*, Burma.
- 3 *O. Thwaitesii* Munro 129, Beddome cccxiii t 322 Vern *Waite* Anamalais Stem 10 to 12 feet 1 inch diam.
- 4 *O. Stockeri*, Munro 130, Beddome cccxiii
- 5 *O. monostigma* Beddome cccxiii

GENUS VII.—*MISOGLYNA*

- 1 *M. bambusoides*, Trin, Munro 132, Kurz n 569 (*Bambusa baccifera* Roxb FJ Ind n 197) Vern *Muli, metunga, bish*, Beng, Eastern Bengal, Chittagong, Tenasserim (E 132), Chittagong)

- 2 *M. Kurzii*, Munro 134 (*Cephalostachyum schizostachyoides*, Kurz n 565) Stems 20 to 30 feet
- 3 *M. hainii*, Kurz n 569 Stems 8 to 15 feet

GENUS VIII.—*CEPHALOSTACHYUM*

- 1 *C. capitatum*, Munro 139, Gamble 87 Vern *Gobia, gopi, Nep, Yangong* Lepcha, *Sillu, Sullea*, Khasia Stems 12 to 30 feet thin yellow semi-scandent, strong with long internodes of about 2½ feet used for bows and arrows by Lepchas The leaves are good
- 2
- 3 *C. latifolium*, Munro 140 Leaves large
- 4 *C. pergracile* Munro 141, Kurz n 564 Vern *Kenca*, Khasia Burma Stems 30 to 50 feet Common in upper mixed forests, often gregarious

GENUS IX.—*PSEUDOSTACHYUM*

- 1 *P. polymorphum*, Munro 142 Vern *Pur-Sikim* at 4,000 to 6,000 feet, Assam (E 1310, Darjeeling Terai)
- 2 *P. compactiflorum*, Kurz n 567 Stems 15 to 25 feet
- 3 *P. Heister*, Kurz n 568 Vern *Waite do wa*, Hills of Burma, up to 3,000 feet (E 1318 Youngoo)

GENUS X.—*BREXIA*

- 1 *B. Rachedii*, Kunth, Munro 144, Beddome
- 2 *B. stridula*, Munro 145, Beddome cccxiii Vern *Balla*, Cingh Stems 6 to 18 feet

Malabar, Cochim

Bombay, Ceylon.

3. *B. Travancorica*, Beddome cccxxiv, t. 324. Hills of Tinnevely and Travancore. Stems 6 to 8 feet. Vern. *Iral*, Travancore. Stems densely gregarious.

## GENUS XI—DENDROCALAMUS.

India and Burma.

1. *D. strictus*, Nees; Munro 147; Beddome cccxxv, t. 325; Brandis 569; Kurz ii. 558. (*Bambusa stricta*, Roxb. Fl. Ind. ii. 193.)

Male Bamboo. Vern. *Bans*, *bans kabau*, *bans khurd*, *kopar* (stem), Hind.; *Karail* (stem), Beng.; *Bas*, *udha*, Bombay; *Halpa*, *vaddar*, *vaddur*, Gondi; *Indo*, Kurku; *Bhuru*, *Baigas*; *Kark*, Pandratola; *Kauka*, Tel.; *Mynwa*, Burm. Leaves often deciduous. The stems are strong, elastic, nearly solid, 20 to 40 and up to even 100 feet high, used for spear handles, and all purposes of building and basket work.

This species occasionally flowers gregariously, but generally single stems only or single clumps are found in flower. Mr. Greig, Conservator of Forests, North-Western Provinces, writing in January 1879, reports the following interesting points regarding the flower of this bamboo in the outer valleys of the Garhwal Hills:—

"We have a wonderful crop of bamboos this year, I have been observing our bamboos a good deal lately, and I have observed numbers with one or two stems of a clump in flower, in some places as many as 5 per cent. of the clumps have flowering stems, and in others I have only found ten clumps with flowering stems out of several thousands examined. Between Kohdwar and Haidu Khata whole clumps over large areas have seeded and died, and the ground is now a dense thicket of young clumps of from 10 to 30 feet high. The seeding commenced here in 1869 or 1870, and has been going on ever since. Many of the few remaining old clumps are now seeding, not one or two stems, but every stem of the clump, and not one single instance did I see in that forest of only one or two stems in seed. These remarks apply to the forests below Gorighat and along the base of the hills between the Ganges and Ramganga rivers. I hope to see the bamboos of the Palam, Kanore, &c., this year, whole areas in those valleys seeded and died in 1877-78."

2. *D. servicus*, Munro 148. Flowered in 1858

3. *D. Parisii*, Munro 149; Brandis 570  
4. *D. membranaceus*, Munro 149; Kurz ii. 560.  
5. *D. giganteus*, Munro 150. (*Bambusa gigantea*, Wall.) Vern. *Walé*, *waga*, Burm. Stems very tall, often 26 inches in girth.  
6. *D. Hookeri*, Munro 151; Brandis 570. Vern. *Ussey*, *assey denya*, *nkotang*, Ass. Stems 50 feet.

7. *D. Hamiltonii*, Nees and Arnott; Munro 151; Brandis 570; Gamble 87. Vern. *Tana*, Nep.; *Pao*, Lepcha; *Pao-shing*, Bhutia *Kokwa*, Beng.; *Wal*, Meehi *Wahnok*, Garo. The common bamboo of the Eastern Himalaya. The palms are large, 3 to 6 inches diameter, rather hollow and not always straight, but they are used for every variety of purpose. This bamboo grows gregariously, on hill-sides, up to 3,000 feet, and the stems are 40 to 60 feet high. They often grow low and tangled, instead of straight, and the bamboo may often be recognised by this

Sikkim, Bhutan, Assam (E 1341, Bannupokri.)

Assam.

Tenasserim (B 1329, Moumein.)

Panjab. (P. 114, Sutley.)  
Martaban (B 1315, Town-  
gore.)

Parasath in Chota Nag-

character and by the very thick shoots which grow out at the nodes. The young shoots are eaten

- 8 *D. crinitus*, Kurz ii 553 Stems 15 to 30 feet. Pegu, Taung, at 3 000 feet.  
9. *D. longispatus*, Kurz ii 561 Vern. *Haya*, Burma (B 1321, Taungoo). Burma Stems 40 to 60 feet

GENUS XII—DINCHLOA.

1. *D. andamanica*, Kurz ii 576. Stems scandent, Andamans

- 2 *D. Macellandii*, Munro 114 Vern *Wanay* (B 1320, Taungoo) Stems 60 to 100 feet, scandent.

The identification of the different species of Indian and Burmese bamboos is still very obscure and requires considerable research to settle accurately. The large leaved

*urishii* from the Punjab, are Indian, while numbers of species are known only by vernacular names. The following of which *Lepcha* names are given, have been collected in Sikkim by Mr. E. Fuchs *Pugriang*, a member of 5 inches and

in, 2½ to 3 inches in *in, pugriak, pobong*, tracts of Chittagong, birch has not yet been *urra, furra*, while more whose identification

SECTION III. CRYPTOGAMIE.  
ORDER CIX. FILICES.

Tree R  
principally  
the West  
described  
species from

1880, p 425. Of true tree ferns there are 4 genera, viz, *Cyathea*, *Hemitelia*, *Alsophila* and *Bolus*

*Cyathea* contains only one species from the Indian Peninsula, viz. *C. spinulosa*, Wall. Kurz ii 572, Clarke p 129, a small tree of Nepal, the Khasia Hills, Tenas- In Ceylon, however, two or three

species. *H. decipiens*, J. Scott, Khasia Hills, and the Hills of

second, Masun, Vern. *Veru*, is the

In *Alsophila*, there are, as far as is yet known, seven Indian species, most of which are found in the Eastern Himalayas. *A. talbotiana*, Hook (part), Kurz ii. 573, Clarke 131, is found in Burma, while a variety of it (*A. Schmidiana*, Kze) occurs in

the Hills of Sikkim. *A. glauca*, J. Sm.; Clarke 432 (*A. confertissima*, Wall.; Kunz ii. 673; Gamble 88) Vern. *Pakli*, *pallidum*, Lepcha, is a splendid tree fern of the lower hills of Sikkim, Eastern Bengal and Burma. It is probably the largest Indian species, reaching a height of 50 feet, with a stem of considerable girth at the base, smaller above but widening again beneath the fronds. These fronds are very large, often reaching 10 to 12 feet in length, and the fern is easily recognized by its smooth rachis and leaves glaucous beneath. *A. ornata*, J. Scott, Clarke 432, and *A. Andersoni*, J. Scott, Clarke 433, are Sikkim species, which are very rare and but little known. They were collected first by the late Mr. Scott, in the Cinchona plantation at Kangbi, at an elevation of 2,500 feet. *A. Oldhami*, Bedd.; Clarke 433 (*A. Scottiana*, Baker; Gamble 88) is a very pretty tree fern, not uncommon about Darjeeling, and usually irregular and branching. *A. glabra*, Hook.; Clarke 433; Kunz ii. 573; Gamble 88, is the common species of the plains. It is found in damp forests in the Sub-Himalayan tract and Eastern Bengal, from Nepal down to Chittagong and Tenasserim, Central and Southern India, and Ceylon (*A. gigantea*, Hook.; Thw. Enam. 396). It is, however, rather a small species, rarely reaching to more than 15 feet, though Clarke says it occasionally attains 50 feet. *A. vivida*, Hook., is a tree fern of South India and Ceylon reaching 20 feet in height and remarkable for its being densely covered with shaggy scales. None of these species are used in India, except that the inner part of the stems of Sikkim species is sometimes eaten by Lepchas. *Burinea insignis*, Hook.; Kunz ii. 574; Clarke 571, is a tree fern of the pine forests of the Marabau Hills, at 4,000 to 6,000 feet elevation. It has a stem only 3 to 5 feet high.

Among other species of ferns, which, though not exactly arborescent, are yet remarkable and of interest in the Indian forests, may be mentioned *Angiopteris erecta*, Hoffm., a thick fleshy fern of most of the moister regions of India, with a huge fleshy root-stock and leaves which often reach 6 feet in length. *Acrostichum aureum*, Linn. Vern. *Mheica*, Beng. is a handsome fern, used occasionally for thatching in the Sundarbans. On the billides and in the forests of most of the mountainous regions of India is found the Bracken, *Pteris equitina*, Linn. *Asplenium polypodioides*, Allet. is a common large-leaved fern of the Himalaya, which has often a distinct stem of a few feet in height, and may almost be ranked as a tree fern.

The structure of the stems of tree ferns presents a great difference from that of either Dicotyledonous or Monocotyledonous trees. The appearance of the stem is usually that of a dark brown cylinder, marked above by regular scars, the bases of fallen leaves, and below by an entangled mass of fibres formed by the interlacement of roots. The inner structure is shown by a horizontal section to consist mainly of three portions: *first*, the outer layer formed by the bases of fallen leaves and interlacing cotlets; *secondly*, the cellular tissue which occupies the greater part of the interior; and, *thirdly*, the vascular bundles which form an irregular and cylindrically arranged ring inside the cortical layer. These vascular bundles present the appearance of a closed mass of curved, usually crescent-shaped, outline, having on the outside a hard black layer of woody fibres, and inside two light-coloured layers of soft tissue, chiefly containing scalariform vessels. When dry, the cellular tissue which fills the interior contracts, leaving usually a hollow space, the ring of vascular bundles then showing a wavy pattern of alternately light and dark layers.













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